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Rabiah Tul Adawiyah Mohamed Salleh[1], Bruno Di Biase[2], Satomi Kawaguchi[2]
[1] Department of English Language and Literature, Kulliyyah of Islamic Revealed Knowledge and Human Sciences, International Islamic University Malaysia, Gombak, Malaysia
[2] Bilingualism Research Lab, Western Sydney University Parramatta Campus, Australia

Lexical and morphological development: A case study of Malay English bilingual first language acquisition

Many first language acquisition (FLA) studies have found a strong correlation between lexical and grammatical development in early language acquisition. For bilingual first language acquisition (BFLA), the development of grammar is also found to be correlated with the size of the lexicon in each language. This case study investigates how a Malay-English bilingual child developed the lexicon and grammar in each of her languages and considers possible evidence of interaction between the languages during acquisition. The study also aims to show that the predominant linguistic environment to which the child was alternatively exposed might have played an important role in her lexical and grammatical development. Thus, the study presents two sets of data: (a) a 12-month longitudinal investigation when the child was 2;10 up till 3;10 in Australia and (b) a one-off elicitation session at age 4;8 when the family was in Malaysia. The findings show that not only the emergence of grammar is linked to the lexical size of the developing languages, but that other variables, mainly the linguistic environment and the bilingual language mode, also influenced the child's language productions.

Key words: language development, bilingualism, Malay-English, lexicon and morphology, processability theory

Address for correspondence: Rabiah Tul Adawiyah Mohamed Salleh, Department of English Language and Literature, Kulliyyah of Islamic Revealed Knowledge and Human Sciences, IIUM, Jalan Gombak, 53100, Malaysia. E-mail: rabiahtuladawiyah@iium.edu.my

In first language acquisition (FLA) studies, a substantial number of studies has repeatedly shown a strong association between children's early vocabulary and their level of grammatical attainment (e.g., Bates et al., 1988; Bates et al., 1995; Bates & Goodman, 1999; Dionne et al., 2003; Fenson et al., 1994: Moyle et al., 2007). Marchman and Bates (1994) proposed the critical mass hypothesis, according to which morphological acquisition is contingent on the child's acquisition of words "most strongly after the number of items in a child's vocabulary reaches a critical mass" (p. 346). The hypothesis is supported by their findings on English monolingual children. In a pioneering study of 1803 English L1 children, Bates et al. (1995) reported a tight relationship between the size of the children's lexicon and the onset of grammar. Their findings indicated three levels of development. Firstly, word combinations appear when the vocabularies fall between 50-200 words. Secondly, verb morphology emerges when the vocabularies are within 400-600 words. Finally, sentence complexity is observed to increase significantly when the children's vocabulary exceeds 400 words. Based on these findings, Bates et al. (1995) suggested that "grammatical development depends upon the establishment of a critical lexical base. Indeed, different grammatical events may each depend upon a different lexical base e.g. word combinations emerge in the 50-100-word range; verb morphology emerges in the 400-600-word range" (p. 11).

Bassano et al. (2004) support this hypothesis, stating that "developments within morphosyntax are triggered by an increase in the size of the lexicon beyond a given level, thus providing support for the interdependence of lexical and morphosyntactic developments" (p. 36). The lexical-grammatical relation is also observed in other L1 acquisition, for example, Italian (Caselli et al., 1995; Caselli et al., 1999), Hebrew (Maital et al., 2000), Icelandic (Thordardottir et al., 2002), and Spanish (Jackson-Maldonado et al., 1993; Jackson-Maldonado, 2012).

Studies investigating the lexical and grammatical relationship show that bilingual children's grammatical abilities are strongly associated with the size of the lexicon in the specific language. For example, Marchman, et al. (2004) in their study of 113 Spanish-English bilingual participants reported that the grammatical ability in Spanish is correlated with the size of the Spanish lexicon and likewise, the grammatical ability in English is correlated with the size of the English lexicon. Conboy and Thal (2006) also reported that the use of relational and function words in English-Spanish bilinguals is dependent on the growth of vocabulary in each language. Similarly, Simon-Cereijido and Gutiérrez-Clellen (2009) also demonstrated high correlations between vocabulary and grammar in 196 Latino five-year-olds. French-English bilinguals also exhibit a similar developmental pattern. French grammar is influenced by the size of French lexicon and vice-versa (David & Wei, 2005, 2008). In a longitudinal case study of a child simultaneously raised in Japanese and English from birth, Itani-Adams (2007) found that the lexical and grammatical development of the child in

Japanese and English developed in a separate but parallel manner. There was no interaction between Japanese and English in the child's development, which the author interpreted as further evidence for the separate development hypothesis (SDH; De Houwer, 1990; Meisel, 1989) in bilingual first language acquisition (BFLA). According to De Houwer (1990), "a bilingual child's morphosyntactic development proceeds along separate, non-intersecting lines for each language" (p. 38). The SDH proposes that children raised in two languages separate the two linguistic systems from early on.

In all these bilingual studies, the researchers could not find any descriptions of the interaction between the children's developing languages. The development of grammar in bilingual children is found to be proportional to the growth of the lexicon within the same language. Thus, they interpret the results as supporting the SDH. However, more studies on different language pairs are needed to understand the relationship between the lexicon and the emergence of grammar in bilingual children. Specifically, whether the developing languages interact with each other in the course of the acquisition needs to be addressed. In their seminal paper, Paradis and Genessee (1996) state that there is a possibility that the two grammars of the bilingual children's developing languages might interact with each other, which would result in their development to be different than in monolingual children. Paradis and Genessee (1996) called this phenomenon "interdependent development," which they defined as "the systemic influence of the grammar of one language on the grammar of the other language during acquisition, causing differences in a bilingual's pattern and rates of development in comparison with a monolingual's" (p. 3).

Another dimension in the bilingual child's language development that seems to be understudied in many bilingual acquisition studies is the influence of the predominant environmental language (Qi & Di Biase, 2020). Most investigations have primarily focused on the structural reasons and linguistic conditions to account for the interactions between the child's developing languages (Yip & Matthews, 2007). With very few exceptions, in studies of bilingual development (e.g., Mohamed Salleh et al., 2019; Qi & Di Biase, 2020), the environmental language surrounding the bilingual child is merely relegated to a background and is considered to play a negligible role in the child's linguistic development.

Therefore, this paper aims to address this gap by investigating the development of lexicon in Malay and English as well as the emergence of morphology in a bilingual child in two different language environments: (a) the mainstream monolingual Australia and (b) the bilingual/multilingual mainstream Malaysia. This paper is part of a longitudinal investigation into the BFLA of Malay and English in one child (see Mohamed Salleh, 2017 for the complete study), using the psycholinguistics framework of the processability theory (PT, Di Biase et al., 2015; Pienemann, 1998; 2005). We aimed to demonstrate how the predominant linguistic environment may lead to different linguistic outcomes for the bilingual child and influence the lexico-morphological interaction between

the two developing languages.

The remainder of the paper is organized as follows. The next section reviews a range of related studies on Malay language acquisition and BFLA, language mode, linguistic environment, and briefly present PT, the theoretical framework adopted in this study. The child's linguistic background, data collection, and data analysis are presented in the Methodology section. Next, the Results and Discussion section present the results and discuss the findings in light of our theoretical framework for interpreting the bilingual child's lexical and morphological development in Malay and English. The paper concludes with the limitation of the study as well as suggestions for future research.

Studies on Malay Language Acquisition and Malay-English Bilingual First Language Acquisition

To date, there seems to be a paucity of studies investigating Malay L1 development. One recent investigation on profiling Malay children's syntactic development was conducted by Razak et al. (2016). In this study, the authors developed the first standardized language test in Malaysia, the *Malay Language Assessment, Remediation and Screening Procedure* (Malay LARSP). In a comprehensive review by Razak (2014), it was found that past acquisition research in Malay L1 (e.g., Arshad & Subramaniam, 2006; Mohamad Noor, 2002; Omar, 1988; Simanjutak, 1990;) has been sporadic and involved mainly case studies of a small number of participants. This leads to the difficulty of establishing normative data for Malay L1 children's language development.

Pertaining to studies investigating Malay-English childhood bilingualism in Malaysia, a systematic review by Soh et al. (2020) reveals that there is also limited research conducted in the local Malaysian context. There is not much information on how Malay-English bilingual children acquire both languages except for some published case studies by Mohamed Salleh et al. (2020), Mohamed Salleh et al. (2019), Mohamed Salleh et al. (2016), and Salehuddin (2012). In a relatively recent study by Mohamed Salleh et al. (2020), the authors investigated the acquisition of English grammar among bilingual Malay-English primary school children. It was found that aside from home and school language environments, the children's language aptitude also plays a role in their attainment of English grammar. In earlier studies by Mohamed Salleh et al. (2019) and Mohamed Salleh et al. (2016), the authors investigated the development of plural expressions in a Malay-English bilingual child; the former examined the influence of the linguistic environment on the child's plural marking expressions in Malay and English while the latter described how the child expressed plurality in the developing languages. Salehuddin (2012) described how a Malay-English bilingual child produced English negative constructions.

With Malaysia being a developing nation, English language proficiency is highly regarded as a desirable attribute for economic and social mobility at the

international level (Gill, 2005; 2014). Due to the global prominence of the English language, it was reported that many parents, especially those in the urban areas, opt to speak English at home to further boost their children's English proficiency (Hashim, 2014). Therefore, understanding the acquisitional process of a child raised in Malay and English and how different variables and environments influence the child's language development might help not only the parents but also educators and linguists.

Language Mode and Linguistic Environment

Grosjean (1998) introduced the concept of language mode, which is defined as "a state of activation of the bilingual's languages and language processing mechanisms at a given point in time" (p. 136). In their daily lives, bilinguals find themselves constantly switching between the monolingual and bilingual language modes; in the monolingual mode, bilinguals find themselves interacting with monolinguals in one of the languages they know. Thus, one language is active, and the other is deactivated. In the bilingual mode, both languages are activated, as the bilinguals are interacting with other bilinguals who share their two languages. Thus, Grosjean states that there is a tendency for bilingual speakers in the bilingual mode to use mixing and code-switching. In this study, we examined how the bilingual language mode contributes to a child's production of mixing utterances.

Studies investigating the role of contexts in bilingual language acquisition are scarce (Lanza, 2004; Qi, 2011). More emphasis is given on the linguistic structures than the context in which these bilingual children acquire their languages. Related to context is input, which De Houwer (2009) defines as the daily contact with a language through interpersonal interaction or by overhearing the language. For bilingual children, input is divided between their two developing languages and is rarely static and equal. Input depends on the amount of time the children spend in each language and the domains of life in which they experience and use each language (Grosjean, 2015). In this study, input refers to the linguistic environment that the child was exposed to.

Several studies have been conducted to investigate the influence of the linguistic environment on bilingual children's language output. Qi and Di Biase (2020) attributed the absence of transfer of wh- in situ in a Mandarin-English bilingual child to the role played by the environmental language the child was in: The input from Australian English (AusE) was robust enough to block the transfer of the wh- in situ construction that is prevalent in Mandarin to AusE. However, there was no change of linguistic environment in Qi and Di Biase's study, unlike in Mohamed Salleh et al. (2019). Mohamed Salleh et al. (2019) found that the Malay-English plural marking expressions of the bilingual child are highly dependent on the predominant linguistic environment: When the child was living in Australia where AusE is more environmentally dominant, she marked the plural both in English and in Malay using the English suffix *-s*. However, when the child was

in Malaysia at 4;8, she marked the plural nouns, both in English and Malay, using reduplication, the Malay grammatical plural marking mechanism (see Mohamed Salleh et al., 2019, for more discussion on the child's plural marking expressions).

Language dominance is a dynamic, multifaceted, and highly complex construct. Treffers-Daller (2019) contends that there are two main dimensions of language dominance: (a) language proficiency and (b) language use. In this study, we followed the concept of dominance as defined by Meisel (1989). According to Meisel, the nature of dominant and weaker language pertains to the presence and frequency of use (i.e., performance rather than competence). The language that is highly used and activated by the child is considered the dominant language. Thus, in Australia, AusE is the language predominantly used in the broad community and the institutions, whereas in Malaysia, Malay is the predominant environmental language (for more details regarding the child's linguistic background, see the Method section).

Processability Theory (PT)

The developmental framework used to analyze the child's morphological development in Malay and English in the current study was PT (Di Biase et al., 2015; Pienemann, 1998; 2005). Processability theory is a framework originally devised for second language acquisition. Later on, PT was also used in the analysis of the sequence of development in FLA (L1) and BFLA (Pienemann, Keßler & Itani-Adams, 2011). Recent studies investigating bilingual acquisition, for example, Mohamed Salleh et al. (2020), Itani-Adams (2013), and Medojevic (2014) also used PT to frame their understanding of language development of bilingual natives.

Processability theory is a language processing model that accounts for the developmental path followed by language learners. It views language acquisition as a hierarchically ordered process whereby learners follow a certain trajectory in the course of their cumulative development. This path proceeds over a fixed number of stages, each of which is characterized by its own speech processing procedure. Processing procedures are universal and, on that basis, PT has the potential to account for the morphological and syntactic development of any language. The view of language processing in PT relies primarily on the speech production model by Levelt (1989), which overlaps to some extent with the computational model of Kempen and Hoenkamp's (1987) and Garrett's (1976, 1980, 1982) work. The basic premises of language processing in PT are as follows (Pienemann, 2005, pp.3-4) ;

a. Processing components are relatively autonomous specialists which operate largely automatically;

b. Processing is incremental;

c. The output of the processor is linear, while it may not be mapped onto underlying meaning in a linear way;

d. Grammatical processing has access to a grammatical memory store.

Processing theory also relies on lexical-functional grammar (LFG) for the representation of grammar. Lexical-functional grammar was conceived by Kaplan and Bresnan (1982) and further developed by Bresnan (2001), Dalrymple (2001), and Falk (2001), among many others. It is used in PT because of its typological and psychological plausibility: It provides a well-defined and explicit generative formal theory of language. These two feeder theories (Levelt's speech model and LFG) allow PT to make predictions about learners' language development, which can be applied cross-linguistically (Bettoni & Di Biase, 2015). Table 1 schematically shows the universal sequence of processing procedures on the example of the development of English morphosyntax, as applied in Di Biase et al. (2015).

In each processing procedure in PT, there are several linguistic structures outlined. According to Di Biase et al. (2015), the linguistic structures are not required to emerge simultaneously for learners to be considered to have reached a particular stage. In Table 1, the first stage is the lemma access where upon learning a second language, the learner produces single words, fixed expressions, and certain lexical items in the language, such as "my name is Pim," or "station here." In this stage, the lexical items and expressions are retrieved from the mental lexicon (i.e., learners memorize the words as chunks) and these words are not yet annotated for any grammatical features. The second stage is the category procedure and it is materialized when the learner begins producing words containing certain grammatical features such as past tense *-ed*, plural *-s*, possessive '*s*, and verb *-ing*. The phrasal procedure stage, the third stage of PT, is more complex because learners are required to activate an exchange of information at the phrasal node between

Table 1. Developmental stages hypothesis for English morphology (Di Biase et al., 2015; after Pieneman, 1998, 2005).

Processing procedure		**Linguistic structure**	**Example**
4. Sentence procedure		SV agreement: 3rd person sg *-s*	"Peter loves rice"
3. Phrasal procedure	NP procedure	phrasal plural marking	"these girls" "three black cats" "many cats"
	VP procedure	AUX + V: have + V-*ed* MOD + V be + V-*ing*	"they have jumped" "you can go" "I am going"
2. Category procedure		past *-ed* plural *-s* possessive '*s* verb *-ing*	"Mary jumped" "my brothers working" "Mary's car" "he eating"
1. Lemma access		single words, formulas	"station here" "my name is Pim"

the lexical components of the phrase, that is, the noun and the quantifier in the Noun Phrase (NP) and the auxiliary and the lexical verb in the Verb Phrase (VP), to produce a complete and coherent phrasal structure. This stage is instantiated through either be +V-*ing* (e.g., "is playing"), have +V-*ed* (e.g., "have played"), a bare infinitive with Modal (e.g., "can play"), or between the NP plural and its determiner (e.g., "many cats"). The plural marking in the category procedure (e.g., my brothers working) refers to the plural referent itself (the use suffix -s in the plural context) without any connection to other elements in the phrase. The plural marking in the phrasal procedure stage, on the other hand, is achieved when the learner is able to produce a noun with a plural marker (e.g., the suffix -*s*) in connection with a numerical or nonnumerical quantifier within the same NP (e.g., "many cats," "three black cats," "these girls").

The final morphological stage is reached when the learner can unify the value of features belonging to different phrases, for example, merge information from an initial NP and the following VP to construct the so-called subject-verb agreement in English. For instance, in the sentence "Peter loves rice," the form of the verb ("loves") must share information about number (singular) and person (3rd) with the subject ("Peter") whose number (singular) and person (3rd) values must match those found on the verb.

The current study was first study to apply PT to Malay language acquisition. Based on PT's universal schedule, we hypothesized the developmental stages of Malay morphological development as shown in Table 2. In working out the hypothesis for Malay PT sequence, we followed the guide given by Bettoni and Di Biase (2015), "the best choice for a diagnostic structure on an untried language should fall on a structure that displays possibly the clearest one-to-one relationship between form and function, or the most representative, or default, structure of a stage in a particular schedule, the one with the most transparent conceptual meaning" (p. 74). The hypothesized Malay linguistic structures were derived from previous Malay L1 studies such as Razak et al. (2016) and Salehuddin and Winskel (2009).

For Malay PT development, at the first stage, the child begins with learning single words such as "nak" 'want', "kucing" 'cat', "anjing" 'dog' and formulaic expressions such as "apa khabar?" 'how are you?'. At the category procedure stage, the child distinguishes at least one lexical category from others. For instance, she learns to distinguish a word such as "main" 'to play' (denoting a process, a verb-like word) and "mainan" 'toy' (denoting an individuated object, a noun-like word). Adding the suffix -an helps distinguish objects from processes and this can be the basis for mentally annotating and marking nouns to distinguish them from (unmarked) verbs. Another form of marking nouns as distinct from verbs is that they can be reduplicated to mark plurality, for example, developing from "kucing" 'cat' to "kucing-kucing" 'cats.' At the next PT stage, that is, the phrasal procedure stage, the child produces VP-like construction such as "nak makan" 'want (to) eat' and NP-like constructions such as "banyak kucing" 'many cat.'

Table 2. Developmental stages hypothesis for Malay morphology (based on Di Biase et al., 2015).

Processing procedure	**Linguistic structure**	**Example**
4. Sentence procedure	Interphrasal structure Relative clauses (topicalization)	"Yang" clause "Yang ini, saya suka" REL this, I like "this one I like"
3. Phrasal procedure	Phrasal morphemes NP unification	Numeral classifiers, e.g. a) "dua ekor kucing hitam" Two tail (CL) cat black "Two black cats" NP procedure (plural marking), e.g., a) "banyak kucing" many cat "many cats"
	Phrasal morphemes VP unification	V + V and AUX + V, e.g., a) "nak makan" want eat "(I) want to eat" b) "boleh main" can play "(I) can play"
2. Category procedure	Lexical morphemes	Suffix -an changes the grammatical category of words e.g., "main" 'play'(V) "mainan" 'toy'(N), "makan" 'eat' (V) "makanan" 'food' (N) "minum" 'drink' (V) "minuman" 'beverage' (N). Reduplication, "kucing" 'cat' vs "kucing-kucing" 'cats' "anjing" 'dog' vs "anjing-anjing" 'dogs'
1. Word/lemma access	Words, formulas	"nak" 'want', "kucing" 'cat', "anjing" 'dog', "apa khabar?"'how are you?'

Numeral classifiers such as "dua ekor kucing" 'two tail (CL) cat' is also included in the Phrasal Procedure stage. Unlike English, subject-verb agreement is not a property of the Malay language. Malay verbs differ from English verbs in that they do not mark tense, aspect, or subject number morphologically. Hence, we hypothesized that to reach the Malay sentence procedure stage, the child must be able to produce the Malay object relative clause "Yang" in which the object is topicalised. The "Yang" morpheme is a relative clause marker which shows "the deictic nominal feature" (Razak et al., 2016, p.154). In Malay, the canonical word

order is subject-verb-object (SVO). So, if the child produces "saya suka yang ini," 'I like REL this', this is the subject relative clause and also the unmarked form in Malay. The child must produce the marked form "Yang ini, saya suka," 'REL this, I like', the object relative clause in which prominence is assigned on the object to be considered as having reached sentence procedure in Malay.

Processability theory has been widely tested over the past two decades in many studies on second language acquisition in a wide range of languages such as English (Pienemann, 1998; Zhang & Widyastuti, 2010), Arabic (Mansouri, 2005; Mansouri & Håkansson, 2007), Chinese (Gao, 2005; Zhang, 2002, 2005), Japanese (Di Biase & Kawaguchi, 2002; Kawaguchi, 2010, 2015), Italian (Di Biase & Kawaguchi, 2002; Di Biase & Bettoni 2015), Swedish (Pienemann & Hakansson, 1999), and Spanish (Bonilla, 2015; Johnston, 2000), among others. For children's bilingual language acquisition, PT has been the framework used by Hardini et al. (2019), Hardini et al. (2020), Mohamed Salleh et al. (2016), Mohamed Salleh (2017), Mohamed Salleh et al. (2019), Mohamed Salleh et al. (2020), Medojevic (2014), and Itani-Adams (2013). In all these studies, it was found unanimously that learners, adults and children alike, follow the stages predicted by PT. Given the widely tried and tested nature of PT, it was used in this study to analyze the child's lexical and grammatical development in both languages.

Methodology

The Child's Linguistic Background

The participant in this study was a firstborn female child named Rina (pseudonym). Rina was born in Malaysia and stayed in Malaysia till the age of 1;11. When she was 1;11 up till 4;4, the family resided in Australia. The family returned to Malaysia when Rina was 4;4. This study analyzed Rina's lexical and morphological productions in Malay and English from age 2;10 to 3;10 at the time when the family was living in Australia, and at age 4;8 when Rina had returned and stayed in Malaysia for four months. Rina was raised in Malay and English since birth; her mother speaks Malaysian English (MalE) with her whereas her father speaks Malay. However, when the family moved to Australia, Australian English (AusE) gradually became the most frequently used language as Rina was sent to the nursery daily. Thus, in Australia, in order to maintain the dual language exposure, the parents shifted to using Malay fully to Rina at home since AusE was the language in which everyone (e.g., friends, neighbors, and childcarers at the nursery) spoke to Rina outside the home domain. When Rina was 4;4, the family returned to Malaysia and the mother reverted to addressing the child in MalE. From age 4;4 onwards, Rina went to a kindergarten in Malaysia. At the kindergarten, she received consistent Malay and English exposure since most of the teachers and her peers were also Malay-English bilingual speakers.

Data Collection

The data in this study were obtained from a longitudinal study while Rina was living in Australia (from age 2;10 up till 3;10) and it includes one-off elicitation sessions in a separate Malay and English context after the child moved to Malaysia (at 4;8). Her utterances from age 2;10 until 3;10 were audio and video recorded using an Olympus linear PCM recorder and Rode microphones. Rina was recorded over two different contexts on a weekly basis: the English and the Malay context. The English context was for sessions where she was playing with other children (whose first language is AusE) in the presence of her parent(s) and the other children's parents. The Malay context was when Rina was communicating with her father at home in Malay. The usual activities during the recording sessions include Rina's spontaneous speech when playing with her toys, during outings and shopping, while eating, and when doing other daily routines. Each session was around 30-45 minutes. At age 4;8, Rina was recorded in one elicitation session in Malay (45 minutes) and one elicitation session in English (45 minutes). The Malay session was carried out by her father, whereas the English session was conducted by her mother. The corpus comprises 54 audio recordings; 27 recording sessions were in the Malay context and 27 recordings were in the English context. Altogether, there were 2430 minutes of recordings in the study.

Data Analysis

The recordings were transcribed using ELAN (Sloetjes & Wittenburg, 2008), a software used to create annotations on video and audio resources. With regard to the child's utterance, we followed the definition given by Ochs (1979), who states that an utterance "should have a single intonation contour and single breath group" (p. 63). Following this practice, this study also classified a single utterance based on a single intonational contour of the child's speech. Rina's utterances were first analyzed using mean length of utterance (MLU; Brown, 1973). Brown (1973) considered MLU as "an excellent simple index of grammatical development" (p. 53) rather than age because the addition of linguistic knowledge usually leads to an increase in children's length of utterances. In the bilingual context, MLU is useful in showing children's progress in both languages and in showing the relative dominance of the two developing languages (Dopke, 1998; Matthews & Yip, 2011). In this study, Rina's MLU development in Malay, English, and also mixed utterances is presented to show her general development during the period of investigation. Following Lanza (2004), the term mixed utterance is used to refer to Rina's utterances, which consist of the combination of elements from Malay and English in a single utterance. Grosjean (1995) states that coactivation and competition of the two languages are the norms for bilingual speakers. Research in BFLA has focused on the language-specific MLU of bilingual children rather than the MLU of mixed utterances (Bernardini & Schlyter, 2004; Itani-Adams,

2013; Qi, 2011). This might be due to the rare occurrences of mixed utterances compared to the language-specific utterances (Keshavarz, 2007). However, as Lanza (2004) stated, bilingual children's MLU of mixed utterances is crucial, as it will give a more accurate and comprehensive estimate of their overall language development. Rina's lexical and morphological development were analyzed at particular developmental points in the study, that is, at 2;10, as an initial baseline in each of the languages, and then at intermediate sensitive points such as 3;4, 3;6; 3;10, and 4;8.

Results and Discussion

To better contextualise the results pertaining to Rina's lexical and morphosyntactic development, Rina's MLU for her mixed utterances is presented in Figure 1 along with her Malay and English MLU for comparison. In their studies, Dopke (1992), Lanza (2004), Keshavarz (2007), and Quick et al. (2018) found that though mixed utterances are fewer in numbers, they nonetheless surpass the values for language-specific MLU. The authors believe that this is unsurprising given that mixed utterances are a combination of elements from the developing languages.

Similar to previous studies, Rina's frequency of mixed utterances was smaller in number compared to her Malay and English ones. From 2;10 to 3;3, Rina's mixed utterance MLU was consistently higher than her language-specific MLU. Then, from age 3;4 to 3;5, her Malay MLU slightly surpassed her mixed MLU. At age 3;6, Rina experienced a rapid increase in her English MLU. At 3;6, all Rina's MLUs (English, Malay, and mixed) seemed to be at the same level (English = 3.74, Malay = 3.56, mixed = 3.68). From 3;7 to 3;8, Rina's mixed utterance MLU was lower than Malay and English MLU. At 3;10, when English MLU increased, her mixed MLU increased as well.

Regarding the one-off elicitation sessions after Rina moved to Malaysia (at age 4;8), her English MLU was 5.76 while her Malay MLU was 5.06. Given that her exposure to Malay was considerably higher at age 4;8, it was initially odd to find that her Malay MLU was lower than her English MLU. However, further analysis of the Malay utterances showed that Rina spoke the colloquial variety of the Malay language. Since this variety of Malay is morphologically simpler than the standard variety (Goddard, 2005; Karim et al., 2008), affixations are optional and seldom used. For instance, in the standard variety of Malay, instead of "tidak apa," 'it's ok', the child used the colloquial variety "takpe." Standard Malay, whose form is regulated by the national language planning institute (Dewan Bahasa dan Pustaka), is used in high-prestige printed materials and official public discourse. On the other hand, colloquial Malay is used among Malay speakers in informal everyday interaction (Goddard, 2002) and this was the variety Rina was exposed to daily at home as well as at the kindergarten from 4;4 to 4;8.

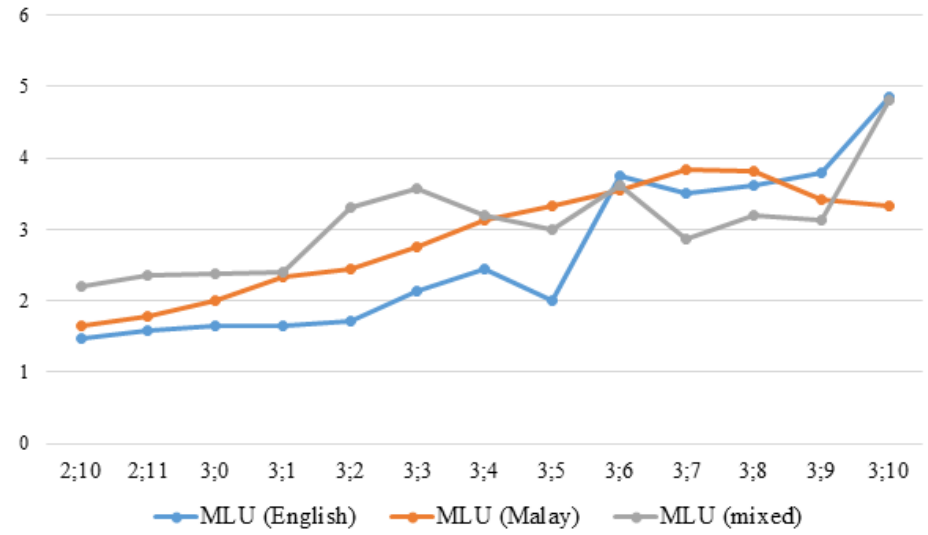

Figure 1. Rina's mean length of utterance in English, Malay, and Mixed from 2;10 to 3;10.

This might explain why Rina's Malay MLU was lower than her English despite receiving higher input from the linguistic environment.

The next two tables present Rina's lexical and morphological development, based on the respective Malay and English elicitation sessions. Table 3 indicates Rina's main lexical categories produced in the Malay context, followed by Table 4 for the English context. The listing of lexical categories is based on Kroeger's (2005) listing of major lexical categories and Razak et al.'s (2016) study on Malay grammar. In the Malay context, Rina was also found to produce some Malay nouns with English suffix -s, e.g., "mainans" 'toys' and "kucings" 'cats'. We classified these as mixed words. The total types and tokens in each language do not indicate the exhaustive number of lexical items but rather the lexical items Rina uttered in the recording sessions.

Rina's lexicon and grammar in the Malay context

The first recorded session, at age 2;10 established the baseline existing at the beginning of the study. At this point, Rina's lexicon consisted of 34 types in Malay and 18 types in English. The highest type of lexical item in Rina's lexicon at 2;10 in the Malay context was nouns. Gradually, from 2;10 to 3;10, verbs became the highest lexical type in Rina's utterances in Malay.

From age 2;10 to 3;10, at the time the family was living in Australia, it was observed that at home, where Malay language was used, Rina tended to speak and code-switch to English even when the adult speakers spoke in Malay. Upon further examination of the recording contexts, the mother, a bilingual Malay-English speaker, was always present in the recording sessions. Although the mother only spoke Malay to Rina during Malay sessions, the fact that Rina knew

Table 3. Rina's composition of lexical items in the Malay context from 2;10 to 4;8. M=Malay word *E= English word

Malay Context											
Lexical categories/age	2;10		3;4		3;6		3;10		4;8		Examples from the corpus
	M	E	M	E	M	E	M	E	M	E	
Noun	10	4	28	15	49	38	28	25	24	0	"kucing" 'cat', "anjing" 'dog, bola 'ball', "mainan" 'toy', "ball," "flower," "book"
Verb	7	6	38	6	43	24	40	28	32	0	"nak" 'want', "makan" 'eat', "main" 'play', "eat," "found," "wearing"
Adjective	5	3	15	4	10	11	11	14	10	0	"comel" 'cute', "kotor" 'dirty', "busuk" 'stinky', "cute," "pretty"
Adverb	2	0	3	4	3	10	4	12	6	0	"aje" 'only', "lagi" 'more' ,"cepat" 'fast', "lambat" 'slow', "more," "hurry"
Others	10	5	10	16	22	18	17	13	35	0	"Ok," "yeah," "no," "tolong" 'please, "ini" 'this', "itu" 'that' "banyak" 'many'
Mixed words	0		0		3		0		0		"mainans" 'toys', "kucings" 'cats', "barangs" 'things'
Total types	34M (18E)		90M (45E)		127M (101E)		100M (92E)		107M (0E)		
Total tokens	112		499		1143		739		497		

the mother's bilingual identity might have contributed to the production of code-switching utterances in the Malay context. Lanza (2000) points out that though adult interlocutors may use one language with the bilingual child, "an indication of comprehension of the other language may contribute to bilingual context" (p. 235). In Rina's case, the sociolinguistic factor of the context might have activated the psycholinguistic aspect of the bilingual language mode (Grosjean, 2008).

Looking at the Malay morphological structure produced by Rina at 2;10, we gain a partial sketch of her grammatical development at this age, when she produced utterances such as the following:

1. a. Rina makan
   Rina eat
   'Rina is eating'

   b. Rina nak
   Rina want
   'Rina wants'

   c. Nak mainan
   want toy
   '(I) want (a) toy'

d. Rina nak susu
Rina want milk
'Rina want some milk'

e. Rina nak main
Rina want play
'Rina wants (to) play'

In terms of Malay morphological development based on PT, Rina was at the category stage, reflected in her use of "main" 'to play' (1e) and "mainan" 'toy' (1c). "Main" in Malay is a verb while adding the suffix -an changes the stem to the noun "mainan." The word order in Malay is SVO, and it also allows for a null subject (Razak et al., 2016). Thus, other than the SVO utterances, Rina also produced a substantial number of null subject utterances in her Malay speech, in which the subject or object was dropped, for instance "Rina makan" (agent + verb) (1a) and "Rina nak," (experiencer + verb) (1b). Rina's Malay utterances at 2;10 resembled 2-year-old Malay monolingual children, as reported by Simanjuntak (1990) and Razak et al. (2016). Most of the children's utterances in their studies were also null subject and object such as "Mak, makan" 'Mum, eat', "nak ikut" 'want (to) follow' and "nak baring" 'want (to) lie down'.

However, looking at Rina's mixed utterances at 2;10, a more complex grammatical structure can be discerned. Her sentence productions, albeit consisting of two different languages, may be considered a well-formed clause, being constituted of subject and predicate, such as:

2. a. I touch tu
I touch that
'I touch that'

b. I touch ni
I touch this
'I touch this'

c. Give me mainan
Give me toy
'Give me (the) toy'

d. Give me air
Give me water
'Give me water'

e. I want main
I want play
'I want (to) play'

Based on the examples, it seems that Rina's expressive strategy was to resort to using words from both her languages. This is reminiscent of what Pearson, Fernandez and Oller (1993) termed total conceptual vocabularies, that is, the vocabularies of all the developing languages of the bilingual child. In this context, mixing is a strategy that allowed Rina to pool all her linguistic resources together to assist her in expressing herself more clearly, especially in the presence of the bilingual interlocutor, namely, her mother. This may help explain why her mixed MLU was higher than her MLU in each separate language at 2;10.

Regarding Rina's use of pronouns, the most common first-person singular pronouns in Malay are "saya" 'I', used in formal occasions and "aku" 'I', used informally among peers (Karim et al., 2008). However, Rina used her name to refer to herself, especially in the Malay context. This is similar to the finding in Mohd Noor's (2013) study: the Malay L1 children she investigated used their names rather than first-person pronouns to refer to themselves. On the other hand, when speaking English, Rina tended to use "I" and "me." This may reflect the different status of pronouns in the two languages (pro-drop and optional in Malay and obligatory in English). Thus, in terms of pronoun use, Rina began distinguishing the two languages early. In Malay, she used her name as a first-person pronoun, comparable to Malay L1 children and in English, she used "I" and "me."

At age 3;4, similar to 2;10, Rina tended to omit the subject in her Malay utterances. The following examples illustrate this phenomenon:

3. a. nak buka
want open
'(I) want (to) open (something)'

b.. nak tengok
want watch
'(I) want (to) watch (something)'

c. nak main rabbit
want play rabbit
'(I) want (to) play (with the) rabbit'

d. nak bagi princess
want give princess
'(I) want (to) give princess (something)'

e. nak makan banana
want eat banana
'(I) want (to) eat banana'

f. nak main ball
want play ball
'(I) want (to) play ball'

Rina used English lexical items to describe objects in the Malay context, such as "rabbit," "princess," "banana," and "ball." In the recordings at age 3;4, there were no equivalent terms in Malay such as "pisang" 'banana', "bola" 'ball', "arnab" 'rabbit, and "puteri" 'princess.' This may suggest that she had not acquired the Malay equivalent terms yet, thus she filled the gap by using the lexical items from English.

In the Malay recording sessions at 3;6, Rina produced 1143 word tokens, with 127 Malay types and 101 English types. Table 3 shows that at this age, she used plenty of English words in the Malay sessions. The following illustrates some examples of Rina's utterances in the Malay context at 3;6:

4. a. Rina nak slime
Rina want slime
'I want slime'

b. Rina nak warna blue
Rina want colour blue
'I want the blue colour'

c. Ini macam whites
this like whites
'this is like white'

d. kuda tak stand up
horse not stand up
'the horse does not stand'

e. Rina nak mainans
Rina want toys
'I want toys'

f. Rina main kucings
Rina play cats
'I play with cats'

"Slime" (a gooey, sticky substance for children to play with) is another lexical item Rina acquired from English. There is no translation equivalent in Malay, hence, when Rina asked for "slime" to play at home, she used the English word. Another noticeable mixing from English at 3;6 was her use of words for colors in English, for example, "blue," "red," "white" and so forth. Rina tended to use English words for colors in the Malay context, possibly because she acquired the words from the childcare domain (AusE environment). There was also the use of suffix *-s* attached to Malay nouns in Rina's utterances at 3;6, shown in Examples 4e and 4f. Rina's use of suffix *-s* with Malay nouns at 3;6 was indeed parallel to the significant increase of the suffix *-s* in the English context (see Examples 9a-9h). Based on PT's morpho-syntactic development, Rina's Malay was at the phrasal procedure stage from 3;4 to 3;6, reflected in her use of VP in Examples 3 and 4.

At age 3;10, Malay verbs formed the largest percentage of Rina's word types in Malay context, followed by Malay nouns and English nouns. This indicates that there was a substantial number of lexical mixing from English in the Malay context at 3;10, similar to 3;6. Some of the utterances at this age include:

5. a. ayah cakap tu ayah cakap quiet
   father say that father say quiet
   'father said to be quiet'

   b. mana the ball?
   where the ball?
   'where's the ball?'

   c. semua toy letak sini
   all toy put here
   'put here all the toys'

   d. hurry hurry hurry lepas tu pergi sekolah
   hurry hurry hurry after that go school
   'quickly, after that we're going to school'

   e. tunggu ayah datang ayah beli gula and jelly and toys
   wait father come father buy candy and jelly and toys
   'when father comes, he will buy candy and jelly and toys'

   f. banyak kucing dekat situ
   many cat near there
   'there are many cats'

g. situ banyak mainan
there many toy
'there are many toys'

h. ayah angkat banyak barang
father carry many things
'father carries many things'

At 3;10, Rina produced Malay NP quantifiers "banyak kucing" 'many cats'(5f), "banyak mainan" 'many toys'(5g) and "banyak barang" 'many things'(5h) to describe plural entities. By unifying the quantifiers with nouns, these utterances signified that she had reached the third stage of PT, the phrasal procedure stage.

The longitudinal study demonstrates that there was an extensive mixing from English in the Malay context. However, the record from the single one-off session conducted in Malay at age 4;8, after four months of continuous residence in Malaysia, indicates no mixing from English in the corpus. The total number of tokens in the single Malay session was 497, with 107-word types. In terms of argument structure, Rina dropped the subject/object when speaking Malay; as mentioned previously, this is indicative of the null-subject aspect of the language. Rina also produced several object relative clauses in her utterances at 4;8. The following are some examples from the corpus:

6. a. Rina cari dua
Rina search two
'Rina is searching for two (something)'

b. Rina letak
Rina put
'Rina put (something)'

c. ayah ambil
father take
'father takes (something)'

d. Yang macam tu, Rina suka sangat
REL like that Rina like very
'The one like this, I really love it'

e. Yang kad ini, ayah letak atas meja
REL card this Father put on table
'This card, father puts on the table'

From the PT perspective, morphologically, Rina was at the sentence procedure stage in Malay, as she produced relative clauses. The following section discusses Rina's lexicon and grammar in the English context. Table 4 shows the composition of Rina's lexical items in the English context.

At 2;10 in the English context, Rina's English MLU was only 1.66, and this corresponded with the low numbers of English types (12) and tokens (25) in the recording sessions. In the sessions, Rina only produced chunks or formulaic expressions such as "no," "yes," "go away," "please," "down," "gimme it." She had not yet orally displayed any productive verbal morphological process in English. Thus, her English production was still at the word level or lemma stage according to PT.

At age 3;4, Rina's total word tokens were 52 and word types were only 30 in English and 1 in Malay. Consistent with her English MLU (2.44) at this stage, her English utterances were mainly at the two-word stage, for example, "more water," "more banana," "more rice," and "wait wait." Even though Rina produced limited English utterances at this point, there were no occurrences of mixed utterances except for some Malay kinship terms such as "abang" 'big brother' and "kakak" 'big sister'. Based on PT stages, Rina was still at the lemma level (word level).

At age 3;6, there was a significant increase in her English development, from MLU 2.44 at 3;4 to MLU 3.74 (see Figure 1). The total number of word tokens in the English context at 3;6 was 595, with 199 word types in English and only 4 word types in Malay. The following are some of Rina's utterances from the corpus at 3;6:

8. a. Abang wearing my dress
   Big brother wearing my dress
   'The boy is wearing my dress'

Table 4. Rina's composition of lexical items in the English context from 2;10 to 4;8. *E= English word *M= Malay word

English Context											
Lexical categories/age	2;10		3;4		3;6		3;10		4;8		Examples from the corpus
	E	M	E	M	E	M	E	M	E	M	
Noun	6	0	12	0	88	1	82	0	42	0	"cat," "dog," "book"
Verb	4	0	8	0	35	0	32	0	25	0	"kick," "take," "play"
Adjective	0	0	3	0	15	0	15	0	10	0	"beautiful," "cute," "shiny," "nice"
Adverb	0	0	1	0	10	0	9	0	3	0	"quickly," "slowly"
Others	2	0	6	1	51	3	44	3	55	1	"yes," "no," "away," "more," "many," "a lot of," "abang" 'big brother', "kakak" 'big sister'
Total types	12E (0M)		30E (1M)		199E (4M)		182E (3M)		135E (1M)		
Total tokens	25		52		595		609		503		

b. I want open it
'I want to open it'

c. I want story
'I want a story'

d. I want blow candle
'I want to blow the candle'

e. I want jumping
'I want to jump'

f. I want yellow hair, not black hair

g. Barbie want story
'Barbie wants a story'

In the examples, Rina had started producing verbal morphological processes, such as her use of -ing in "wearing" and "jumping." Rina also produced suffix -*s* in her English lexical items, often overextending it. The following are some examples from the corpus in which the suffix -*s* was used (the underlined words show the use of suffix -*s*):

9. a. daddy dads go aeroplane
b. a horse and little girls
c. that elephants
d. it is showers
e. not yets daddys heres
f. I colours
g. Is go my sleep now (Rina overextended the suffix -s to the I pronoun)

In the recording sessions with the other AusE L1 children, though Rina produced mostly ungrammatical sentences such as Examples 9a-9g, the other children were not bothered with her utterances as they focused mainly on playing with toys. At one point, she referred to another child as "abang" 'big brother'(8a), and her mother explained the meaning of the kinship term to the other parents.

Looking at the suffix -*s*, it seemed that the child attached the suffix not only to content words (e.g., "girls," "dads," "colours"), which were clearly not plural entities, but also function words (e.g., "heres," "yets," "Is"). We surmise that the suffix -s at this age was her overgeneralization of a salient morphological English marker. It is entirely plausible that she had just noticed -*s* as a prominent feature of English and she generalized the suffix to other English lexical items.

The emergence of verbal morphological processes at 3;6 is consistent with the critical mass hypothesis proposed by Marchman and Bates (1994), according to which verbal morphology only emerges when the child's vocabulary ranges between 400-600 words and sentence complexity will increase markedly when the child's vocabulary exceeds 400 words. Based on the above examples, a significant difference between Rina's English linguistic structure at 3;4, when she only had less than 100 English words, and at 3;6, when she started acquiring more words, can be seen. At this stage, in terms of her morphological development, Rina had proceeded to the category stage of PT, reflected in her use of suffix -ing on verbs.

Another significant MLU increase was at 3;10. Rina's English MLU went from 3.8 at age 3;9 to 4.85 at age 3;10. In terms of argument structure, Rina produced complete arguments in her English utterances, exemplified by the following:

10. a.I want this one
    b. I want pink boat
    c. I ask you
    d. you catch other one
    e. I caught this one
    f. you bought that
    g. I give for baby
    h. It get shiny shoes

At 3;10, English irregular past tense emerged (e.g., "I caught," "you bought"). In terms of mixing, there was no lexical mixing from Malay found in the English context. Importantly, Rina had also started to produce English NP quantifiers when describing more than one entity and unify their plural value with the plural marker *-s* on the noun, for example, "many cats," "many dogs," "many books." Thus, she had reached the PT phrasal stage for her English development at this point.

In the English recording session at 4;8, the total number of word tokens was 503, with 135-word types; numerals were among the highest because the elicitation session prompted Rina to describe singular versus plural objects. In terms of argument structure, she produced clauses with complete arguments, such as the following:

11. a. I just looking only
    b. We see something
    c. I gonna take the dog
    d. You said cows
    e. She go there
    f. I like flower flower
    g. I think it's dog dog
    h. can't you see ball ball?

i. I know it's cat cat

Similar to the Malay context at age 4;8, there were no occurrences of lexical mixing with Malay found in the session. However, instead of lexical mixing, Rina used the Malay grammatical plural mechanism, reduplication, to pluralize nouns in English, reflected in Example 11f-i (see Mohamed Salleh et al., 2019 for a fuller discussion on Rina's plural expressions). At 4;8, Rina had yet to produce the third person singular *-s*. She used the default form of verb instead, shown in Example 10h and 11e. Therefore, from the PT perspective, Rina was still at the phrasal procedure stage in English.

Based on Rina's MLU and lexical development throughout the longitudinal investigation (from 2;10 to 3;10) and the one-off session (4;8), there are several important observations. Firstly, the lexicon was the driving force of her grammatical development. This is evident especially in her English development. In the beginning, at age 2;10, when her total word tokens in English were less than 100 words, word combination and verb morphology were nonexistent. However, when she acquired more words at 3;6, significant improvement could be seen: She combined words and produced inflections, and her sentence complexity also markedly increased. Thus, the findings lend further support for the critical mass hypothesis that "grammar is an inherent part of the lexicon" (Bates & Goodman, 1999, p. 53). Also, Rina's lexical development shows that grammar is driven by the size of her lexicon, providing support for the lexicalist theories such as Kaplan and Bresnan's (1982) and Bresnan's (2001) LFG. The grammar of her two languages eventually developed when Rina acquired more words in each language. This is compatible with the cumulative nature view of children's language development and appears to support the emergentists proposal.

Another observation that can be made concerns the influence of the predominant environmental language throughout development. Studies investigating the relationship between a bilingual's lexicon and grammar show that the link only holds in each language: The lexicon affects the grammar of one language rather than having influence across different languages. However, in Rina's corpus, when one of the languages acquired more words and became more linguistically developed, she used the lexical items from this language in the other language. Mixing in Malay contexts corresponded to the increase of English MLU and vocabulary size. As Rina learned new words in English, she used these words when speaking in Malay. When she was living in Australia in a predominant AusE environment, some of the plural structures she used in the English context were also used in the Malay context; for example, she occasionally used the plural suffix -s and paired it with Malay nouns (e.g., "kucings" 'cats', "mainans" 'toys'). The presence of the Malay-English bilingual mother in the Malay recording sessions had also significantly activated Rina's bilingual language mode, resulting in the child's mixing of English in the Malay context at home.

At 4;8, a different pattern of development could be observed. Lexical mixing

from the other language was not found in the recording sessions. Rina spoke English and Malay in the respective contexts. Whereas in the longitudinal study, the lexical items from the more dominant language (i.e., English) occurred in the less dominant language (i.e., Malay), at age 4;8, the lexical items from Malay, which is the environmentally dominant language in Malaysia, did not appear when she spoke English. However, mixing appeared to be in the form of her use of Malay reduplication in English utterances. It is possible that the automatization and constant use of Malay plural mechanism had influenced Rina's performance in English at that time under the influence of massive Malay input she received from 4;4 to 4;8, both from her extended family at home and the extra-domestic environment. This interaction was possible because Rina was at a stage where she could process those plural structures in both languages. This is in line with the developmentally moderated transfer hypothesis (Pienemann, Di Biase & Kawaguchi, 2005), according to which learners can transfer what they can process. This finding strongly suggests that linguistic environment is an important variable in children's bilingual development and performance.

From the PT perspective, Rina's morphological development in each language developed according to the hypothesized PT sequences: word stage > category stage > phrasal stage > sentence stage. The differences between the Malay and English developmental trajectory were in the pace and level of acquisition: Malay developed first, followed by English. There was a clear difference in the timing of emergence for each PT stage in Malay and English. Malay reached the category procedure stage earlier at 2;10, further proceeded to the phrasal procedure stage at age 3;4, and reached the sentence procedure stage at 4;8. On the other hand, English developed later than Malay. Rina was at the English lemma stage from 2;10 to 3;4, only moved to the category procedure stage at age 3;6, and reached the phrasal procedure stage at 4;8. In English, Rina had yet to reach the sentence procedure stage. Rina's PT developmental stages in Malay and English are summarised in Table 5.

Conclusion

The current study presented the first attempt to explore the development of lexicon and grammar in a Malay and English bilingual child within the framework of PT. Generally, the findings show that the child's lexicon size and grammar were interrelated, with the grammar only emerging when she had acquired a certain number of words, evidenced in her development of English morphology. As the child accumulated more words, her sentences in both English and Malay became longer and markedly more complex. In terms of mixing, several factors come into play. The bilingual language mode and the predominant linguistic environment were found to contribute to the high occurrence of mixing in the Malay context when the child was in Australia. When the family returned to Malaysia, mixing in the English context appeared in a different form; instead of lexical mixing, the

Table 5. Summary of Rina's morphological development in Malay and English.		
Age	Malay	English
4;8	S Procedure Object relative clause "Yang macam tu, Rina suka sangat" REL like that Rina love very 'I love something like this'	Phrasal procedure, NP plural unification "Many books," "many cats"
3;10	Phrasal procedure NP plural unification "banyak kucing" 'many cat', "dua kek" 'two cake'.	Phrasal procedure, NP plural unification "Many cats," "two cats"
3;6	Phrasal procedure, VP; "nak main princess" want play princess '(I) want to play with (the) princess' "nak mainan princess" nak toy princess '(I) want (the) princess (doll)'	Category procedure "lemons," "pens," "jumping," "wearing"
3;4	Phrasal procedure, VP; "nak bagi princess" want give princess '(I) want (to) give (to) (the) princess	Lemma access/single word and formula "wait wait," "banana," "more water"
2;10	Category procedure "main" 'to play' (V) and mainan 'toy'(N).	Lemma access/single word and formula "no," "go away," "up," "down"

child used the Malay grammatical mechanism of reduplication when speaking in English. Thus, based on the child's lexical and morphological development, the developing languages did not develop autonomously. The linguistic structures manifested bidirectional interactions from English to Malay as well as from Malay to English.

The results for the PT sequence in Malay and English, as discussed, comply with the universal developmental sequence postulated in PT. These findings give further support to the applicability of PT across languages. As proposed by Pienemann (1998; 2005), the main tenet of PT is that language acquisition proceeds incrementally in an orderly manner, constrained by the second language learners' processing resources. This tenet is also applicable for children acquiring two first languages that are typologically distant, as shown by Rina's development in Malay and English.

Bilingual first language acquisition studies in Malay-English are still an area that needs further exploration. To generalise the findings obtained here on other Malay-English bilingual children, a large number of informants are needed. Therefore, future research investigating the development of these two languages on a large number of participants is highly recommended. Studies on bilingual or multilingual children would be beneficial to parents, teachers, and policy-makers so that concerns about these children's language development can be alleviated.

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References

Arshad, M. A., & Subramaniam, V. (2006). Pemerolehan morfologi dan sintaksis dalam kalangan kanak-kanak melayu pada peringkat menjelang tatabahasa [The acquisition of morphology and syntax among Malay children at the pre-language stage]. *Jurnal Dewan, 6*, 112–120.

Bassano, D., Laaha, S., Maillochon, I., & Dressler, W. U. (2004). Early acquisition of verb grammar and lexical development: Evidence from periphrastic constructions in French and Austrian German. *First Language, 24*(1), 33–70. https://doi.org/10.1177/0142723704040704

Bates, E., Bretherton, I., & Snyder, L. (1988). *From first words to grammar: Individual differences and dissociable mechanisms*. Cambridge University Press.

Bates, E., Dale, P. S., & Thal, D. (1995). Individual differences and their implications for theories of language development. In P. Fletcher & B. MacWhinney (Eds.), *The handbook of child language* (pp. 96–151). Blackwell.

Bates, E., & Goodman, J. C. (1999). On the emergence of grammar from the lexicon. In B. MacWhinney (Ed.), *The emergence of language* (pp. 29–79). Lawrence Erlbaum.

Bernardini, P., & Schlyter, S. (2004). Growing syntactic structure and code-mixing in the weaker language: The ivy hypothesis. *Bilingualism: Language and Cognition, 7*(1), 49–69. https://doi/org/10.1017/S1366728904001270

Bettoni, C., & Di Biase, B. (2015). Processability Theory: theoretical bases and universal schedules. In C. Bettoni & B. Di Biase (Eds.), *Grammatical development in second languages: Exploring the boundaries of processability theory* (pp. 19–81). Eurosla.

Bonilla, C. L. (2015). From number agreement to the subjunctive: Evidence for Processability Theory in L2 Spanish. *Second Language Research, 31*(1), 53–74. https://doi.org/10.1177/0267658314537291

Bresnan, J. (2001). *Lexical-functional syntax*. Blackwell.

Brown, R. (1973). *A first language: The early stages*. Harvard University Press.

Caselli, C., Bates, E., Casadio, P., Fenson, J., Fenson, L., Sanderl, L., & Weir, J. (1995). A cross-linguistic study of early lexical development. *Cognitive Development, 10*(2), 159–199. https://doi.org/10.1016/0885-2014(95)90008-X

Caselli, C., Casadio, P., & Bates, E. (1999). A comparison of the transition from first words to grammar in English and Italian. *Journal of Child Language, 26*, 69–111.

Conboy, B. T., & Thal, D. J. (2006). Ties between the lexicon and grammar: Cross-sectional and longitudinal studies of bilingual toddlers. *Child Development, 77*(3), 712–735. https://doi.org/10.1111/j.1467-8624.2006.00899.x

Dalrymple, M. (2001). *Syntax and semantics: Lexical functional grammar.* Academic Press.

David, A., & Wei, L. (2005). *The composition of the bilingual lexicon*. [Conference

presentation]. 4th International Symposium on Bilingualism.

David, A., & Wei, L. (2008). Individual differences in the lexical development of French-English bilingual children. *Bilingual Education and Bilingualism, 11*(5), 598–614.

De Houwer, A. (1990). *The acquisition of two languages from birth: A case study*. Cambridge University Press.

De Houwer, A. (2009). *Bilingual first language acquisition.* De Gruyter.

Di Biase, B., & Bettoni, C. (2015). The development of Italian as a second language. In C. Bettoni & B. Di Biase (Eds.), *Grammatical development in second languages: Exploring the boundaries of processability theory*. (pp. 117–148). Eurosla.

Di Biase, B., & Kawaguchi, S. (2002). Exploring the typological plausibility of Processability Theory: Language development in Italian second language and Japanese second language. *Second Language Research, 18*(3), 274–302. https://doi.org/10.1191/0267658302sr204oa

Di Biase, B., Kawaguchi, S., & Yamaguchi, Y. (2015). The development of English as a second language. In C. Bettoni &B. Di Biase (Eds.), *Grammatical development in second languages:exploring the boundaries of processability theory* (pp. 85–116). Eurosla.

Dionne, G., Dale, P. S., Boivin, M., & Plomin, R. (2003). Genetic evidence for bidirectional effects of early lexical and grammatical development. *Child Development, 74*(2), 394–412. https://doi.org/10.1111/1467-8624.7402005

Dopke, S. (1992). *One parent-one language: An interactional approach*. John Benjamins.

Dopke, S. (1998). Competing language structures: The acquisition of verb placement by bilingual German-English children. *Journal of Child Language, 25*(3), 555–584. https://doi.org/10.1017/S0305000998003584

Falk, Y. N. (2001). *Lexical-functional grammar: An introduction to parallel constraint-based syntax*. CSLI Publication.

Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D., & Pethick, S. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development., 59*(5), 1–173. https://doi.org/10.2307/1166093

Gao, X. (2005). *Noun phrase morphemes and topic development in L2 Mandarin Chinese: A processability perspective* [Doctoral dissertation, University of Victoria].

Garrett, M. F. (1976). Syntactic process in sentence production. In R. Wales & E. Walker (Eds.), *New approaches to language mechanisms* (pp. 231–256). North Holland.

Garrett, M. F. (1980). Levels of processing in sentence production. In B. Butterworth (Ed.), *Language production: Speech and talk* (Vol. 1, pp. 177–220). Academic Press.

Garrett, M. F. (1982). Production of speech: Observations from normal and pathological language use. In A. W. Ellis (Ed.), *Normality and pathology in cognitive functions* (pp. 19–76). Academic Press.

Gill, S. K. (2005). Language policy in Malaysia: Reversing direction. *Language Policy, 4*(3), 241–260. https://doi.org/ 10.1007/s10993-005-7859-9

Gill, S. K. (2014). *Language policy challenges in multi-ethnic Malaysia*. Springer.

Goddard, C. (2002). Semantic primes and universal grammar in Malay (bahasa Melayu). In C. Goddard & A. Wierzbicka (Eds.), *Meaning and universal grammar: theory and empirical findings* (Vol. 1, pp. 87–172). John Benjamins.

Goddard, C. (2005). *The languages of East and Southeast Asia*. Oxford University Press.

Grosjean, F. (1995). A psycholinguistic approach to code-switching: The recognition of guest words by bilinguals. In L. Milroy & P. Muysken (Eds.), *One speaker, two languages: Cross-disciplinary perspectives on code-switching* (pp. 259–275). Cambridge University Press.

Grosjean, F. (1998). Studying bilinguals: Methodological and conceptual issues. *Bilingualism: Language and Cognition, 1*(2), 133–149. https://doi.org/10.1017/S136672899800025X

Grosjean, F. (2008). *Studying bilinguals.* Oxford University Press.

Grosjean, F. (2015). The Complementarity Principle and its impact on processing, acquisition, and dominance. In C. Silva-Corvalán & J. Treffers-Daller (Eds.), *Language dominance in bilinguals* (pp. 174–194). Cambridge University Press.

Hardini, I., Di Biase, B., Kawaguchi, S., & Reid, C. (2020). The effect of developmentally moderated focus on form instruction in Indonesian kindergarten children learning English as a foreign language. *Instructed Second Language Acquisition, 4*(1), 49–61. https://doi.org/10.1558/isla.39724

Hardini, I., Kawaguchi, S., Reid, C., & Di Biase, B. (2019). Early lexical and grammatical development of English in Indonesian kindergarten children. *Asiatic, 13*(1), 76–102.

Hashim, A. (2014). English and the linguistic ecology of Malaysia. *World Englishes, 33*(4), 458–471. https://doi.org/10.1111/weng.12107

Itani-Adams, Y. (2007). Lexical and grammatical development in Japanese-English bilingual first language acquisition. In F. Mansouri (Ed.), *Second language acquisition research: Theory-construction and testing* (pp. 173–198). Cambridge Scholars Press.

Itani-Adams, Y. (2013). *One child and two languages: Acquisition of Japanese and English as bilingual first languages*. Lincolm.

Jackson-Maldonado, D. (2012). Verb morphology and vocabulary in monolinguals, emerging bilinguals, and monolingual children with primary language impairment. In B. Goldstein (Ed.), *Bilingual language development and disorders in Spanish-English speakers* (2 ed., pp. 153–173). Brookes.

Jackson-Maldonado, D., Thal, D., Marchman, V., Bates, E., & Gutierrez-Clellen, V. (1993). Early lexical development in Spanish-speaking infants and toddlers. *Journal of Child Language, 20*(3), 523–549. https://doi.org/10.1017/S0305000900008461

Johnston, M. (2000). *Stages of development for English as a second language.*

Language Australia.

Kaplan, R. M., & Bresnan, J. (1982). Lexical-functional grammar: A formal system for grammatical representation. In J. Bresnan (Ed.), *The mental representation of grammatical relations* (pp. 173–281). MIT Press.

Karim, N. S., Farid, M., Hashim, H., & Abdul Hamid, M. (2008). *Tatabahasa dewan*. Dewan Bahasa dan Pustaka, Kuala Lumpur.

Kawaguchi, S. (2010). *Learning Japanese as a second language: A processability perspective*. Cambria Press.

Kawaguchi, S. (2015). The development of Japanese as a second language. In C. Bettoni & B. D. Biase (Eds.), *Grammatical development in second languages: Exploring the boundaries of processability theory* (pp. 149–172). EuroSLA.

Kempen, G., & Hoenkamp, E. (1987). An incremental procedural grammar for sentence formulation. *Cognitive Science, 11*(2), 201–258. https://doi.org/10.1016/S0364-0213(87)80006-X

Keshavarz, M. H. (2007). Morphological development in the speech of a Persian–English bilingual child. *Journal of Psycholinguistic Research, 36*, 255–272. https://doi/org/10.1007/s10936-006-9044-5

Kroeger, P. R. (2005). *Analyzing grammar: An introduction*. Cambridge University Press.

Lanza, E. (2000). Concluding remarks: Language contact-a dilemma for the bilingual child or for the linguist. In S. Dopke (Ed.), *Cross-linguistic structures in simultaneous bilingualism* (pp. 227–245). John Benjamins.

Lanza, E. (2004). *Language mixing in infant bilingualism: A sociolinguistic perspective*. Oxford University Press.

Levelt, W. J. M. (1989). *Speaking: From intention to articulation*. MIT Press.

Maital, S. L., Dromi, E., Sagi, A., & Bornstein, M. H. (2000). The Hebrew communicative development inventory: Language specific properties and cross-linguistic generalizations. *Journal of Child Language, 27*(1), 43–67. https://doi.org/10.1017/S0305000999004006

Mansouri, F. (2005). Agreement morphology in Arabic as a second language: typological features and their processing implications. In M. Pienemann (Ed.), *Cross-linguistic aspects of processability theory* (pp. 117–153). John Benjamins.

Mansouri, F., & Håkansson, G. (2007). Conceptualising intra-stage sequencing in the learner language. In F. Mansouri (Ed.), *Second language acquisition research: Theory-construction and testing* (pp. 95–119). Cambridge University Press.

Marchman, V., & Bates, E. (1994). Continuity in lexical and morphological development: A test of the critical mass hypothesis. *Journal of Child Language, 21*(2), 339–366. https://doi.org/10.1017/S0305000900009302

Marchman, V. A., Martínez-Sussmann, C., & Dale, P. (2004). The language-specific nature of grammatical development: Evidence from bilingual language learners. *Developmental Science, 7*(2), 212–224. https://doi.org/10.1111/j.1467-7687.2004.00340.x

Matthews, S., & Yip, V. (2011). Unbalanced bilingual acquisition as a mechanism of grammatical change. *Bilingualism: Language and Cognition, 14*(2), 159–

161. https://doi.org/10.1017/S1366728910000593

Medojevic, L. (2014). *The effect of the first year of schooling on bilingual language development: A study of second and third generation Serbian-Australian 5-year-old bilingual children from a processability perspective.* [Doctoral dissertation, Western Sydney University].

Meisel, J. M. (1989). Early differentiation of languages in bilingual children. In K. Hylstentham & L. Obler (Eds.), *Bilingualism across the lifespan: Aspects of acquisition, maturity and loss* (pp. 13–40). Cambridge University Press.

Mohamad Noor, H. N. (2002). Pemerolehan bahasa kanak-kanak melayu: Satu kajian kes [Language acquisition of a Malay child: a case study]. *Jurnal Dewan, 2*, 465–489.

Mohamed Salleh, R. T. A. (2017). *Bilingual first language acquisition in Malay and English: A morphological and suprasegmental study in the development of plural expressions in a bilingual child*. [Doctoral dissertation, Western Sydney University]. http://210.48.222.80/proxy.pac/docview/2034359984?accountid=44024

Mohamed Salleh, R. T. A., Di Biase, B., & Ramlan, W. N. M. (2020). The acquisition of English grammar among Malay-English bilingual primary school children. *GEMA Online® Journal of Language Studies, 20*(4), 166–185. http://dx.doi.org/10.17576/gema-2020-2004-10

Mohamed Salleh, R. T. A., Kawaguchi, S., & Di Biase, B. (2019). A case study on the acquisition of plurality in a bilingual Malay-English context-bound child. *GEMA Online® Journal of Language Studies, 19*(3), 22–42. http://dx.doi.org/10.17576/gema-2019-1903-02

Mohamed Salleh, R. T. A., Kawaguchi, S., Jones, C., & Biase, B. D. (2016). The development of plural expressions in a Malay-English bilingual child. *Asiatic, 10*(2), 60–81.

Mohd Noor, P. (2013). *A study of first person singular pronouns in Malay child language* [Conference presentation]. 3rd International Conference on Foreign Language Teaching and Applied Linguistics, Sarajevo, Bosnia and Herzegovina

Moyle, M. J., Weismer, S. E., Evans, J. L., & Lindstrom, M. J. (2007). Longitudinal relationships between lexical and grammatical development in typical and late-talking children. *Journal of Speech, Language, and Hearing Research., 50*(2), 508–528. https://doi.org/10.1044/1092-4388(2007/035)

Ochs, E. (1979). Transcription as theory. In E. Ochs & B. Schieffelin (Eds.), *Developmental pragmatics* (pp. 43–72). Academic Press.

Omar, A. (1988). Faktor Psikolinguistik dan sosiolinguistik dalam pelajaran dan pemelajaran bahasa [Psycholinguistic and sociolinguistic factors in learning and acquiring language]. *Jurnal Dewan, 32*, 5–17.

Paradis, J., & Genesee, F. (1996). Syntactic acquisition in bilingual children: Autonomous or interdependent? *Studies in Second Language Acquisition, 18*(1), 1–25. https://www.jstor.org/stable/44487857

Pearson, B. Z., Fernandez, S. C., & Oller, D. K. (1993). Lexical development in

bilingual infants and toddlers: Comparison to monolingual norms. *Language Learning, 43*(1), 93–120. https://doi.org/10.1111/j.1467-1770.1993.tb00174.x

Pienemann, M. (1998). Language processing and second language development: processability theory. John Benjamins Publishing Company.

Pienemann, M. (2005). Discussing PT. In M. Pienemann (Ed.), *Cross-linguistic aspects of Processability Theory* (pp. 61–83). John Benjamins.

Pienemann, M., Di Biase, B., Kawaguchi, S., & Hakansson, G. (2005). Processing constraint on L1 transfer. In J. F. Kroll & A. M. B. De Groot (Eds.), *Handbook of bilingualism: Psychological approaches* (pp. 128–153). Oxford University Press.

Pienemann, M., & Hakansson, G. (1999). A unified approach towards the development of Swedish as L2: Processability account. *Studies in Second Language Acquisition, 21*(3), 383–420. https://www.jstor.org/stable/44486912

Pienemann, M., Keßler, J.-U., & Itani-Adams, Y. (2011). Comparing levels of processability across languages. *International Journal of Bilingualism, 15*(2), 128–146. https://doi.org/10.1177/1367006910380037

Qi, R. (2011). *The bilingual acquisition of English and Mandarin: Chinese children in Australia*. Cambria Press.

Qi, R., & Di Biase, B. (2020). The influence of the environmental language (Lε) in Mandarin-English bilingual development: The case of transfer in wh-questions. *International Journal of Bilingualism, 24*(4). 691–714. https://doi.org/10.1177/1367006919876716

Quick, A. E., Lieven, E., Backus, A., & Tomasello, M. (2018). Constructively combining languages: The use of code-mixing in German-English bilingual child language acquisition. *Linguistic Approaches to Bilingualism, 8*(3), 393–409. https://doi.org/10.1075/lab.17008.qui

Razak, R. A. (2014). Studies on the acquisition of morphology and syntax among Malay children in Malaysia: Issues, challenges and needs. In H. Winskel & P. Padakannaya (Eds.), *South and Southeast Asian psycholinguistics* (pp. 133–145). Cambridge University Press.

Razak, R. A., Jin, L., Lim, H. W., & Aziz, M. A. (2016). Profiling Malay children's syntactic development: A Malay-LARSP. In D. Crystal, J. M. Ball, & P. Fletcher (Eds.), *Profiling grammar: More languages of LARSP* (pp. 135–169). Multilingual Matters.

Salehuddin, K. (2012). The acquisition of English negative constructions by a Malay bilingual child. *3L: The Southeast Asian Journal of English Language Studies, 18*(4), 181–191.

Salehuddin, K., & Winskel, H. (2009). An investigation into Malay numeral classifier acquisition through an elicited production task. *First Language, 29*(3), 289–311. https://doi/org/10.1177/0142723709103187

Simanjutak, M. (1990). Pertumbuhan dan perkembangan bahasa kanak-

kanak [The growth and development of child language]. [The growth and development of child language]. *Jurnal Dewan, 34*, 692-704.

Simon-Cereijido, G., & Gutiérrez-Clellen, V. F. (2009). A cross-linguistic and bilingual evaluation of the interdependence between lexical and grammatical domains. *Applied Psycholinguistics, 30*(2), 315–337. https://doi/org/10.1017/S0142716409090134

Sloetjes, H., & Wittenburg, P. (2008). *ELAN* (Version 4.9.3). Nijmegen, The Netherlands. http://tla.mpi.nl/tools/tla-tools/elan/

Soh, O.-K., Azman, H., & Ho, S. M. (2020). A systematic review on bilingualism and language processing from 2015–2019. *3L: The Southeast Asian Journal of English Language Studies, 26*(1), 18–31.

Thordardottir, E. T., Weismer, S. E., & Evans, J. L. (2002). Continuity in lexical and morphological development in Icelandic and English-speaking 2-year-olds. *First Language, 22*(1), 3–28. https://doi.org/10.1177/014272370202206401

Treffers-Daller, J. (2019). What defines language dominance in bilinguals? *Annual Review of Linguistics, 5*(1), 375–393. https://doi.org/10.1146/annurev-linguistics-011817-045554

Yip, V., & Matthews, S. (2007). *The bilingual child: Early development and language contact*. Cambridge University Press.

Zhang, Y. (2002). Describing the L2 acquisition process: The genitive and attributive markers of Mandarin Chinese. *Journal of the Chinese Language Teachers Association, 37*(2), 75–112.

Zhang, Y. (2005). Processing and formal instruction in the L2 acquisition of five Chinese grammatical morphemes. In M. Pienemann (Ed.), *Cross-linguistic aspects of processability theory* (pp. 155–177). John Benjamins.

Zhang, Y., & Widyastuti, I. (2010). Acquisition of L2 English morphology: A family case study. *Australian Review of Applied Linguistics, 33*(3), 29.21–29.17. https://doi.org/10.2104/aral1029