Chapter 9
Issue in Bilingualism: English-Chinese Code-Switching Past and Present

Hockhuan Goh and Kaycheng Soh

Code-switching (CS) is a common linguistic phenomenon found in almost any bilingual or multilingual community. This phenomenon means alternation between two or more sets of linguistic codes in a person's utterance during a conversation. Such alternation is not only found in adults' talk but also among conversations of young children. In the past, many studies on CS have reservations over this phenomenon as some researchers viewed it as a manifestation of incompetence or confusion in the two languages. This is still perceived by some language purists and language educators today (Goh et al. 2007). On the other hand, CS is viewed positively by other researchers (Poplack 1980; Genesee 1993; Genesee 2001). They have shown that CS consistently adheres to certain linguistic patterns and this means that it is not a result of confusion or incompetence. Moreover, some research has revealed that children use CS for various communicative purposes, like showing intimacy to interlocutors, differentiating interlocutors who speak different languages, etc. (Al-Khatib 2003; Genesee 2002; Genesee 1993, 2004; Li and Milroy 1995; Poplack 1980; Reyes 2004; Romaine 2004).

Although CS has many years of research, there is to-date little consensus. This lack of consensus is not only a result of the diverse research perspectives of researchers but also of the basis of what researchers considered as a switch. This is reflected in the terminologies that researchers have used to address the phenomenon i.e. *code mixing, code changing, language alternation* and *borrowing* (Al-Khatib 2003; Genesee et al. 2004; Plaff 1997). Other than differences in terminologies, the criteria for what is considered a switch is also diverse. Some researchers have chosen to give CS more specific criteria by restricting it to switch instances of certain physical length, e.g. beyond a word (Poplack 1980; Reyes 2004), or switch instances that bear intentions for discourse or pragmatic purposes (Auer 2005; Li 2005), while

H. Goh (✉) • K. Soh
Singapore Centre for Chinese Language, Singapore, Singapore
e-mail: hockhuan.goh@sccl.sg

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other researchers set no specific criteria and put all switch instances under the umbrella term of CS or code mixing (Genesee et al. 2004; Romaine 2004).

Previous Studies

CS has been widely studied from many perspectives. Some studies approached it from a social constructivist viewpoint and regarded it as some sort of reflection on the speaker's identity, mirroring societal change or growth that one has undergone in a particular social context (Al-Khatib 2003; Baynham 1993; Kanno 2000). Another set of studies focused on discourse or pragmatic perspectives and regarded CS as a function or conversational tactic in communicative activities among bilinguals (Auer 2005; Li 2005; Reyes 2004). Another key area of research is from the linguistic perspective, which seeks to uncover its nature via descriptive analysis of its frequency, its pattern and the grammatical constraints that govern the phenomenon in bilingual utterances (Dimitrijević 2004; Muysken 1997; Poplack 1980). Other than these perspectives, some studies have also explored the cognitive aspect of CS to reveal the connectedness between the languages of the bilingual (Paivio 1971; Paivio and Desrochers 1980; Paivio et al. 1988; Danan 2006; Sham 2002).

Cognitive Aspect At a theoretical plane, CS is predicated by the assumption that information (meanings) in one language can be accessed via another language and is available in second language when needed. Otherwise, whatever learned in one language is available only in *that* language alone by which it was originally learned, and the two languages of a bilingual person function separately and independently with no possibility of cross-language referencing. Paivio and Desrochers (1980) derived his bilingual dual-coding theory by expanding Paivio's (1971) earlier dual-coding theory which deals with the meanings only of a single language. Paivio (1971) originally proposed that cognitive activity is mediated by two independent but interacting symbolic systems: (1) the imagery system which processes perceptual information and generates mental images and (2) the verbal system which processes linguistic information and generates speech. The two systems are then connected by the reference connector which allows the two systems to interact in both directions. Figure 9.1 depicts the three systems and their relations.

In this model, words (configuration of sounds of a spoken language or strokes of its writing system such as in Chinese) in the sensory system activate verbal representations in the verbal system, and objects (pictures) in the imagery system activate imaginal representations: thus, linking the verbal representation to its image establishes a word-meaning link or the other way round establishes an image-word link. However, the systems work probabilistically, depending on the contexts and past experiences when the connection between word, verbal meaning and image. The probabilistic nature of the link may explain the strength of a connection between a word and its meaning when one is to evoke the other in, for example, recalling the name of a person and his appearance.

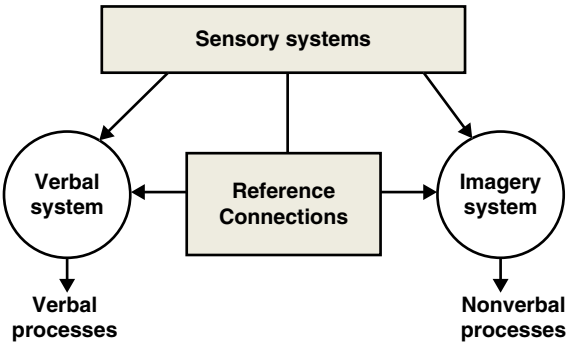

Fig. 9.1 Paivio's dual-coding system

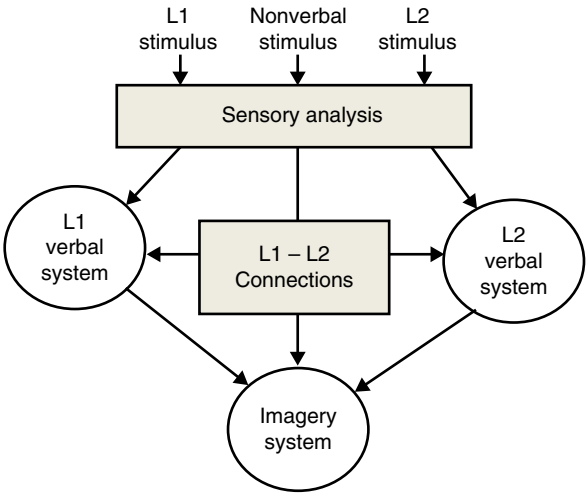

Fig. 9.2 Paivio-Descrochers' bilingual dual-coding model

Paivio and Desrochers (1980) extension of Paivio's original dual-coding theory allows for two languages. In this bilingual dual-coding theory, there are now two independent but interconnected verbal systems both linked to a common imagery system (Fig. 9.2).

In this bilingual model, certain assumptions are made with regard to the independence and inter-connectedness of the three systems:

1. The image systems function independently from the two verbal systems. This extends the assumption of the original monolingual dual-coding theory.
2. The three systems are interconnected at the referential level such that either the verbal system can be influenced by the imagery system or *vice versa.*
3. The two verbal systems have referential connections to the imagery system and are partly shared and partly independent. This implies that (a) a referential overlap between languages is a matter of degree (probabilistic) and (b) the imagery system provides a means of indirect access from one language to the other.
4. The two verbal systems of bilinguals are independent yet partly inter-connected. This implies that, with a change in the language input (or a contextual cue of the nature of the audience), CS can occur.

Ever since the first appearances of the two models with 10 years apart, both theories have received much empirical supports, but criticisms are not totally absent. For a historical reason, there are far more studies on Paivio's dual-coding theory than on the Paivio-Desrochers bilingual dual-coding theory. It is readily recognised that the two types of studies have different orientations. By definition, studies using the bilingual dual-coding theory focus not only on the imagery-verbal connections of meanings but also on the L1-L2 connections across languages such as CS.

In Paivio et al.'s (1988) study, French-English bilinguals freely recalled lists of concrete and abstract words, repeated at different inter-item lags, repeating the same words, translation equivalents or same-language synonyms. The results agreed with previous studies and lent support to the dual-coding theory and also the hypothesis of two independent storages of bilingual memory. Of special interest to the present article are the findings that semantic repetitions through translations (CS) had an additive effect on recall and that semantic repetition effect was weaker for within-language synonyms than for cross-language referencing especially for abstract words.

In a practical way, subtitles of TV or video are assumed to help in the understanding of programme in a foreign language with which the viewers are supposedly unfamiliar. This involves linking images to a language and should support Paivio's dual-coding theory. In a study, Danan (2006) compared the facilitating effect of subtitled video programmes in the learning of foreign languages. Three viewing methods were compared: (1) French audio only, (2) English subtitles and (3) English dialogue with French subtitles. In two experiments, English subtitles were replaced with bimodal input of French audio with French subtitles. Participants who were college students of French at beginners' and intermediate levels were tested on vocabulary recall after watching a five-minute video excerpt in French. The success of reversed subtitling (English dialogue with French subtitles) proved to be the most beneficial condition. This was attributed to translation facilitating foreign language encoding. It was further argued that multiple memory paths created by the visual and bilingual input enhanced retrieval; this is in line with the bilingual dual-coding theory which is the theoretical underpinning of CS.

It is readily appreciated that studies such as those by Paivio et al. (1988) and Danan (2006) involve mainly European languages which belong to the same linguistic family (e.g. French and English) and not with unrelated languages (e.g. Chinese and English). Recently, an interest in pairing English and Asian languages emerges as the number of European learners of Asian languages is on the increase, due to increased political and economic reasons. Since the Paivio-Desrochers bilingual dual-coding theory was developed implicitly for English and related languages, its validity when non-European languages are involved needs to be verified. Although such studies are still few in comparison, more research can be expected in time to come.

Taura (1998, 1996) put the bilingual dual-coding theory to test directly. The study involved 64 high school students (17 male and 47 female with an average age of 15.8) who were bilinguals balanced in Japanese and English and had returned to Japan after having resided in English-speaking countries (including Australia, Canada, New Zealand, the UK and USA). They were presented (via 53 slides) pictures for labelling in English, Japanese words for translating into English and

English words for copying. Without prior warning, the students were tested on recall of the English words. The results are 7.64 (SD 2.39) for labelling, 6.61 (SD 2.23) for translation and 2.06 (SD 1.59) for copying. The effect size for between the first two conditions is Cohen's $d=0.43$, showing a small advantage for labelling over translation. But, the effect sizes for the first two conditions over the third are $d=2.33$ and $d=1.90$, respectively, indicating the advantage of the first two conditions. Of interest to the present study is that translation involving CS, and it is nearly as effective in memory as seeing pictures. Thus, the efficacy of the bilingual dual-coding theory is supported.

In another study conducted in Sydney and Hong Kong involving a non-European language, Sham (2002) paired English and Chinese. Fifth to ninth-graders whose first language or medium of instruction was English but who learned to read Chinese as a second language participated in the study. In one of the experiments, sixth-graders learned to read compounds of two Chinese characters under two conditions: (1) word-and-word presentation and (2) picture-and-word presentation. Note that the first condition evoked the Paivio-Desrochers bilingual dual-coding theory and the second the original Paivio dual-coding theory (for one language). Results show that phonetic compounds were learned better when presented along with their English equivalents (i.e. CS) than when accompanied by a picture of the object represented. In another experiment, Sham (2002) had ninth-graders who learned six concrete sentences and six abstract sentences in Chinese under two conditions: (1) no-picture condition where a Chinese sentence was printed on a card underneath its English translation (i.e. CS) and (2) with-picture condition where a picture was placed above the sentences. Results show the CS (i.e. no picture) conditions better than the with-picture condition. Moreover, the difference between the two conditions was greater for concrete sentences than for abstract sentences. The first finding lent support to the Paivio-Desrochers bilingual dual-coding theory, but the second finding seems to contradict it.

In summary, from the cognitive perspective, the studies have attempted to uncover the underlying principles of CS, and the Paivio's dual-coding theory seems to shed some light on this phenomenon. In principle, these studies found that the two language codes of a bilingual are partially connected and can make cross-language reference without imagery cues. Moreover, they have also found additive effect of language retrieval and recall when subjects are presented with dual-coded testing instruments, though with some contradicting findings. In view of the contradiction, a modified dual-coding model based on the bilingual dual-coding theory for different patterns of reading Chinese as a second language will be proposed in the latter section.

Linguistic Aspect In an attempt to analyse the CS phenomenon, Poplack (1980) incorporated both linguistic and extra linguistic factors into a single analytical model. She derived a set of sophisticated coding scheme to annotate her transcribed data and generated a comprehensive quantitative outline on the CS details and CS tendencies of her 20 Puerto Rican informants, by reporting on the percentage of syntactical categories of CS occurrences found in her data. Besides obtaining this

quantitative sketch of CS, she also attempted to map her findings with the informants' demographic details, e.g. age, educational status and social network, through a language-attitude questionnaire. Syntactically, the study found that there were virtually no ungrammatical combinations of Spanish and English in the CS occurrences of the Puerto Rican informants, and the finding held for non-fluent bilingual informants as well. It was also noted that the informants were more likely to switch larger constituents than smaller constituents. From a pragmatic point of view, she concluded that discourse was a choice of modes that appealed to the speaker in a speech community rather than a choice of language. Once the criteria were met for the discourse mode, the constituent in a sentence was free to switch as long as the switch adhered to the various CS constraints (e.g. equivalent constraint or free morpheme constraint). She also found that speakers who had greater bilingual ability had engaged in more instances of intra-sentential CS, which were deemed traditionally by researchers as trails of language deficiency. She, moreover, observed that true bilinguals, who were learners of both languages since early childhood, most likely produced such intra-sentential CS. Hence, it was concluded that intra-sentential CS is indeed a linguistic performance that requires a high level of linguistic skills in both languages.

Besides, Muysken (1997) also constructed a framework for the CS phenomenon. In his study, Muysken put forward three types of intra-sentential CS, i.e. alternation (CS that involved switches from L1 to L2 with switches in grammar and lexical items), insertion (CS that embedded lexical or phrasal items of L1 into the sentential structure of L2) and congruent lexicalisation (CS for which lexical items from L1 and L2 could be filled interchangeably due to the sharing of an identical grammatical structure between the two languages). He used these types to analyse CS instances presented in various past research papers. In the midst of his analysis, he noted that the differences between the three types of CS might not be clear-cut, for example, longer insertion would result in the imposition of grammatical structure of the inserted language and hence could be also seen as an alternation. Despite illustrating the criteria of the three types of CS, he also attempted to map the CS categories onto the various typologies of societal settings. With these categories, Muysken hypothesised that Alteration was common in societies that had a relatively stable language environment where languages were clearly separated among the bilinguals. Insertion, on the other hand, was common in neo- or ex-colonial societies or the first or third generation of an immigrant society, where languages conformed to one of the dominant language system in the bilinguals. Lastly, congruent lexicalisation was common among the second generation in an immigrant society where languages were accorded almost equal prestige by the bilinguals.

Other than Poplack and Muysken's analysis that comes from the linguistic point of view, the phenomenon of CS had also been explored from the pragmatic perspective, with the intention to understand the social or interaction causes contextualised for CS via conversational analysis.

For example, Li and Milroy (1995) examined CS in a Chinese community in Britain via sequential analysis of their conversations and found that CS had been used by bilingual speakers to contextualise preference organisation and repair their

daily verbal communications. It acted as an additional conversation management resource for bilinguals as compared to monolinguals. Reyes (2004) also incorporated the conversational analysis methodology into his study on the functions of CS among school children's conversation, and he illustrated that children used CS for various functions like clarification and persuasion. As Hammink (2000) summasized, many CS studies pointed out that young children seem to code-switch for adapting to the linguistic abilities of their conversational partners or for using the more readily available lexical items, whereas adults code-switch to emphasise a point, to demonstrate ethnic identity or group solidarity or to exclude individuals from conversation. As children grow older, they adopt the adult's approach to CS. Moreover, younger children under the age of nine favour single-item switch, usually nouns or adjectives, while older children switch with more complex phrases and clauses. In general, these studies show that CS has different functions and these functions are different for adult and child bilinguals.

Apart from international studies, researchers in Singapore have also shown interest in the CS phenomenon. Tan (1988) did an observational study of one family and attempted to map out the CS tendencies of speakers across the family's three generations. It was found that the informants in the study code-switched functionally with reference to conversation topics (i.e. CS is motivated by the topic in conversation; see Tan 1988: 72 for specific examples), situations (i.e. CS is motivated by the degree of formality or intimacy between interlocutors, Tan 1988: 74), repetition (i.e. CS is motivated as repetition of a term for the purpose of clarification or emphasis, Tan 1988: 75), habitual usage of lexical items (i.e. CS is motivated because certain lexical items are habitually said in one code rather than the other, Tan 1988: 77), etc. Other than showing the functions of CS, Tan also found in her study that the informants' CS does not conform to various constraints like phrasal constraint, conjunction constraint, embedded relative clause constraint, equivalence constraint, etc. For example, in the case of phrasal constraint, it is believed that the bonds between the elements of certain phrase structures are unbreakable (e.g. article + noun) and CS will not occur in such phrases' elements. However, Tan found that her informants performed CS in such phrases, e.g. 'a suing (in Hokkien, meaning *box)* so dirty' (Tan 1988: 85), which obviously violated this constraint, as an English article had been strung with a Mandarin noun (for other explanations and examples on other constraints, see Tan 1988: 86–91). Tan's study hence concluded that the various linguistic constraints of CS postulated by many linguists do not hold scientifically in the Singapore context. She believed that general social factors or functions are still the key indicators that trigger CS in Singapore.

Generally, the studies reviewed above uncovered the linguistic and pragmatic aspects of CS. From the linguistic aspect, CS had been found to adhere to certain linguistic constraints which in a way suggested that the phenomenon of CS may not be the result of language incompetence or confusion. From the pragmatic aspect, it was found that CS was used to contextualise preference organisation and repair daily verbal communications so as to carry out various functions, such as clarification and persuasion. Other than studying the functions and constraints of CS, there are indeed attempts to address the concern of CS's adverse effect on language

learning, as CS may indeed be a function of language dominance. For instance, Foo (2011), in Singapore, uncovered the link between language dominance and CS patterns through code-switched nouns and verbs of English-Chinese bilingual university students. Code-switched nouns and verbs showed directionality from dominant to non-dominant language. Although language dominance is a factor that affects directionality, it does not seem to be the main factor. However, the correlation between incidents of CS and language proficiency shows their concurrence, but the causal direction remains a contention as to which causes which. To outline the CS phenomenon in Singapore and further discuss its effect among Singaporeans, a recent sociolinguistic study on CS will be introduced later.

Attitude Aspect There is a plethora of studies on attitudes towards CS appearing in the recent years, especially regarding English-Spanish bilingual programmes in the American context. However, no attempt is made here to make a comprehensive summary of them, but some will be cited for illustrative purpose in support of the argument of this study.

Hammink's (2000) study involved 21 adults and 32 fourth-grade students who spoke English and Spanish and investigated the patterns of CS as well as attitudes towards it. On the latter, the author found the attitudes of adults and students generally were similar although the students tended to be more positive. To some extent, attitudes towards CS tended to be correlated with bilingual proficiency: 69 % of bilingual students considered CS as being friendly (endorsing *It sounds friendly when people mix Spanish and English*), 58 % of monolingual students thought likewise and less than 50 % of adults did so. As for the effect of understanding (endorsing *It is easy to understand a person who mixes Spanish and English*), monolingual and bilingual students were similarly positive (53 % and 54 %, respectively), but adults were slightly less positive (48 %). However, while showing a statistically significant correlation between CS attitude and behaviour for adults ($r = .71$), the correlations are non-significant among monolingual students ($r = .08$) and bilingual students ($r = .45$).

Most recently, Olmo-Castillo (2014) studied the attitudes of teachers towards CS within English-Spanish dual language programme classroom. Based on the results of her survey, the author concludes that dual-language teachers have misconceptions and negative views on heritage language learners' CS within the classroom.

Understandably, much of recent studies on CS have been dealing with the combination of English and Spanish in the American context, especially with reference to *No Child Left Behind.* Note also that the two languages are much more closely linked as compared with the pairing of English and Chinese which Singaporean students learn concurrently right from the first day of formal schooling. In the recent years, more studies on Chinese-English CS emerge, but most involve college students learning English or Chinese as the second languages, especially in the People's Republic of China, involving college students. That is to say, not much research has been done on the issue of Chinese-English CS of primary and secondary students. Some available ones are summarised below.

For instance, Yao (2011) studied the attitudes of in-service teachers (N = 52) and their students (N = 100) in senior classes with regard to teachers using CS as a teaching device in China. Of the teachers, 81 % agreed or strongly agreed that English-Chinese CS enabled them to express more clearly, and only 10 % of the teachers agreed that teachers' CS would cause student difficulty in understanding the teachers. And, 65 % of the teachers *disagreed* that CS would pollute the languages. As for the students, 93 % agreed or strongly agreed that CS enabled teachers to express themselves more clearly, and only 16 % of the students agreed that teachers' CS would cause student difficulty in understanding the teachers. Moreover, 64 % of the students *disagreed* that CS would pollute the languages. In short, both teachers and students held positive attitudes towards CS.

In a similar context, Ma (2014) conducted a study of 58 Chinese undergraduate students' attitudes towards CS in a financial university in the Hunan province of China. They studied English for at least seven years prior to admission to the university, but 44 % of them considered their English was just average. On the question whether it was necessary for the teachers to code-switch in the bilingual classroom, 99 % agreed that they would not be able to understand the teachers nor the textbooks and would lost interest in learning English. However, more than half of the students thought that the teachers should use CS no more than 50 % of the class time. Students considered CS by the teachers proper for explaining the meaning of sentences and when they could not express clearly in English. As for CS among peers, the students' attitude was either neutral or positive. The author concluded that '*findings from the present study are in general accordance with previous studies that suggest CS is beneficial to the efficiency of bilingual courses such as accounting English*' (p. 184). Similar findings have been reported by other researchers who conducted their studies in similar Chinese context (Liu 2010; Xu 2010, Weng 2012).

As rightly pointed out by Wang and Kirkpatrick (2012), the large influx from different countries of Chinese language learners into the People's Republic of China shapes the Chinese language as a foreign language, but how Chinese language teachers decide on their choice of codes remains an under-researched area. The authors studied 24 Chinese language teachers from four universities in Beijing on their beliefs towards CS. Their findings showed that although the teachers made an effort to abide by a Chinese-only principle, English was nevertheless regularly and strategically employed as an international *lingua franca* for explanation, managing and interaction. The authors were critical of the one-size-fits-all Chinese-only policy and suggested that teachers of Chinese language as a foreign language might need to re-examine the policy and develop an alternative pedagogy that allows the use of code-switching in their classrooms in judicious ways. They foresee that the use of CS to English is likely to become even more helpful as the classrooms become increasingly diverse and multilingual. In comparison, this diversification seems to be a trend found in Singapore classrooms albeit at the school level where students are coming from more and varied language backgrounds, both local and from abroad.

As pointed out by Cheng (2013), Singapore, Hong Kong and England and Wales strictly forbid CS in language lessons. The author's study involved 32 English

teachers of Chinese ethnicity attending a teacher training programme in Singapore. They came from 28 different universities throughout China and were teaching in tertiary institutes in China. Of these teachers, 94 % considered their students' underdeveloped English ability as the most significant factor influencing their choice of language in class. At the same time, 65 % of the teachers placed English proficiency as the second most significant factor, and this reflects the belief that English language can only be taught in using it, implying that CS is due to the teacher's own inadequacy. Other factors influencing the choice to or not to code-switch include teaching activities (41 %), rules or policies (38 %) and students' attitude (38 %). Cheng (2013) also reported two main groups of purposes CS was used for: language learning and class management. In the first group are checking comprehension (28 %), highlighting important points (38 %) and teaching grammar and abstract words (695). In the second group are establishing teacher-student rapport (25 %), maintaining class discipline (13 %) and saving time and energy (31 %). The author concluded that CS is an unavoidable phenomenon in Chinese as a foreign language setting, the educational authorities need be aware of this and further research is indicated.

The above studies have shown that there is indeed a change in attitude towards the CS phenomenon in the classroom. Previously, teachers had negative views on language learners' CS within the classroom, and they believed that a language could only be taught using *that* particular language. If a teacher used CS, it was said to be due to the teacher's own inadequacy in the language. In the recent years, teachers and students indeed agreed that CS enabled teachers to express themselves more clearly. Furthermore, both teachers and students have also *disagreed* that CS would pollute the languages. In principle, CS is believed to be beneficial to the efficiency of bilingual courses, especially lending its support for language learning, classroom management and interaction.

In sum, the literature shows that CS is underpinned by bilingual dual coding of a common pool of knowledge or meanings. Overtly, CS seems to be guided by constraints among competent language users and fulfils pragmatic roles or serves communicative functions. Furthermore, CS is, indeed, supported and preferred by teachers and students in the language classrooms.

Study 1: CS of Preschool Children in Singapore (Goh 2012)

In the previous section, we have seen various aspects of CS, and undoubtedly this phenomenon is gaining its importance as a social and pedagogical strategy. However, before further advocacy for its use in the Singapore classroom, there will be a need to understand this phenomenon in the Singapore context and whether such phenomenon can be used. In this section, we shall focus on CS situations among Singaporean children.

To illustrate the CS situation (i.e. from Mandarin to English) in Singapore, this section draws upon data of the Singapore Children Spoken Mandarin Corpus

(SCSMC) which is constructed by the Chinese Language Research Team of the Centre for Research in Pedagogy and Practice at the National Institute of Education. The corpus comprises language data from 600 preschool children. The data mainly comprise spoken Mandarin from 5-year-old children who were engaged in a 30-min one-to-one interview. The interview consists of two parts, a 15-min free talk which is merely a casual talk with the child on topics of his interest, such as classmates, teachers, lessons, cartoons or toys, etc.; then, there is a 15-min picture elicitation whereby pictures of scenes at seaside, school canteen, home and playground were shown to the students to stimulate their Mandarin output. Each child's language output was audio recorded and transcribed into texts with reference to the transcribing convention of SCSMC.

From the corpus, 80 preschool children were chosen based on their home-language background. The home-language background of each child was determined by a survey on his home-language exposure and use, via the Chinese Exposure Index (CEI) that represents the home-language dominance of the child on a scale of −1.0 to 1.0. A negative value of CEI signifies that the child is less Chinese dominant and comes from an English-speaking home, whereas a positive value signifies that the child is more Chinese dominant and comes from a Chinese-speaking home. Four home-language groups were identified based on the CEI and were named (1) predominantly English-speaking homes (PESH), (2) more English-speaking homes (MESH), (3) more Mandarin-speaking homes (MMSH) and (4) predominantly Mandarin-speaking homes (PMSH). With these four groups identified, 20 children were systemically selected at equal intervals along the name list of children in each group arranged in alphabetical order. The transcripts of these selected children are then drawn from the corpus and annotated manually for CS instances. Each CS instance was differentiated for inter-utterance or intra-utterance code-switching to identify the common types of code-switching the children engaged in. The intra-utterance code-switching instance is further differentiated for alternation, insertion or congruent lexicalisation to identify the common type of intra-utterance code-switching. To understand the common grammatical categories being code-switched, the part of speech of each code-switched instance was also annotated for analysis.

Frequency The frequency of CS turns is summarised in Table 9.1 where mean percent of 23.6 (15.0) shows that CS is a common phenomenon among Singaporean Chinese preschool children in their Mandarin communication. This finding is corroborated by some previous studies (e.g. Domingue 1990; Myers-Scotton 1993; Ruan 2003).

As Table 9.1 shows, the PESH group yielded 31 % of CS in their Mandarin utterances, whereas PMSH group produced on only average 17 %, only about half of the PESH. The MESH and the MMSH have 23 % and 24 %, respectively. These indicate a large difference between the two 'prominent' groups but not between the two 'more' groups. Moreover, the correlation between CS frequency and the CEI is estimated as $r = -.310$ ($p < .001$, two tailed), indicating a weak to moderate *negative* relationship between the compared variables. Thus, about one-quarter of the

Table 9.1 Frequency of CS

Groups	Audible turns	CS turns	% of CS	Mean % of CS (SD)
PESH	4459	1305	29.3	30.6 (17.6)
MESH	4608	1032	22.4	22.9 (15.4)
MMSH	5011	1167	23.3	24.1 (13.0)
PMSH	4899	750	15.3	16.6 (10.6)
Total	18,977	4254	22.4	23.6 (15.0)

utterances involve CS. This is indeed not surprising as they were brought up in the multilingual Singapore. Secondly, from Table 9.1, it can be seen that PMSH children produced the least CS in terms of their percentage of CS, whereas PESH children produced the most CS output. As for MESH and MMSH children, their average percentage of CS output is moderate, somewhere in between PESH and PMSH children. This distribution of CS frequency forms a near-linear negative relation between CS frequency and home-language exposure of the informants. Even without a strong relationship, the Pearson correlation coefficient is still significant. Although it is undeniable from the linguistic competence point of view, that CS is displayed suggests some degree of incompetence in Mandarin among the informants. CS can be unarguably understood as the communicative competence of PESH children who overcome their linguistic disadvantage by means of CS. By using another language (i.e. English) that they have acquired, they are able to more accurately express their thoughts and facilitate communication.

Types of Code-Switching CS has often been differentiated in terms of inter-sentential or intra-sentential by researchers (Chen 2009; Muysken 1997; Poplack 1980; Yu 2005). The categorisation differentiates CS instances within or beyond sentence boundaries. However, sentence boundaries of children are relatively hard to define, as children are quite fond of producing utterances consisting clauses loosely conjoined or partially completed. The distribution of these two types of CS among children of different home-language backgrounds is summarised in Table 9.2 which shows that most CS is intra-utterance, 68 % compared with 32 % of intra-utterance CS.

When the two types of CS are viewed against the total audible turns, intra-utterance CS is more frequent than inter-utterance CS (15 % vs. 7 %). These suggest that intra-utterance CS is the prominent type of CS, probably most common among young Singaporean bilingual preschool children.

When viewed across the home-language groups, there are variations. Firstly, the PESH group produced the higher per cent inter-utterance CS (54 %) when compared to those from the other three groups (21–25 %). This is probably due to the extensive utilisation of their English language to support their communication in Mandarin. Secondly, PESH children generally produced fewer intra-utterance CS (46 %) when compared to the other three groups (75–79 %). It is interesting to note that intra-utterance CS correlates with CEI with a negligible $r = -.011$ but there is a

Table 9.2 Types of CS

Home lang.	Inter-utterance CS			Intra-utterance CS		
Groups	Freq	% CS	% Aud.	Freq	% CS	% Aud.
PESH	710	54.4	15.9	595	45.6	13.3
MESH	262	25.4	5.7	770	74.6	16.7
MMSH	240	20.6	4.8	927	79.4	18.5
PMSH	162	21.6	3.3	588	78.4	12.0
Total	1374	32.3	7.2	2880	67.7	15.2

moderate r = −.513 ($p < .001$, two tailed) between inter-utterance CS and CEI. This indicates that while intra-utterance CS is quite independent of the children's home language, inter-utterance CS is negatively related by language used at home.

However, when comparing the intra-utterance CS against audible turns, the percentages of intra-utterance CS (PESH ~13.3 %; PMSH ~12.0 %) between PESH and PMSH children are similar. Their percentage is generally lower than MESH and MMSH children, who produced 16.7 % and 18.5 % of intra-utterance CS among their total audible turns, respectively. This suggests that intra-utterance CS may be prominent among MESH and MMSH informants and PESH and PMSH informants generally engage less in this type of CS. Although having similar percentage of intra-utterance CS, it should be noted that PESH children use fewer intra-utterance CS because they use more inter-utterance CS (i.e. 54.4 % of their total CS turns), whereas PMSH informants use fewer intra-utterance CS (21.6 % of their total CS turns). The low percentage of inter- and intra-utterance CS in PMSH informants is in line with their small percentage of CS in general (a low 15.3 % of CS among their total audible turns, see Table 9.1). From these observations, a trend seems to emerge in terms of the type of CS employed by children from different home-language backgrounds, i.e. for children from PESH background, they tend to use more inter-utterance CS, whereas the MESH and MMSH children use more intra-utterance CS, and PMSH children use the least of both types of CS (though with a preference for intra-utterance CS when they code-switch).

In sum, children from PMSH background generally use more intra-utterance CS than did their MESH and MMSH counterparts. Secondly, children with the least Mandarin exposure (PESH) tend to employ more inter-utterance CS. According to Poplack (1980), intra-utterance CS is a form of language performance that signifies better competence in the dominant language, because intra-utterance CS calls upon a good knowledge of syntactical rules to decide if a switch is permitted in the dominant structure. With children from most of the home-language groups employing similar amount of intra-utterance CS, it is believed that the bilingually exposed MESH and MMSH groups and the most Mandarin-exposed group (PMSH) have attained the basic syntactical rules of Mandarin. With this linguistic knowledge, they are more likely to use intra-utterance CS that allows them to insert words or phrases of English into their Mandarin utterances with ease, so as to compensate their lack of Mandarin vocabulary or expression at the point of speech or help them to more accurately and efficiently express themselves.

Table 9.3 Types of intra-utterance CS

Home lang.	Alternation			Insertion			Congruent lexicalisation		
Groups	Freq	% Intra	% CS	Freq	% Intra	% CS	Freq	% Intra	% CS
PESH	31	5.2	2.4	541	90.9	41.5	23	3.9	1.8
MESH	12	1.6	1.2	746	96.9	72.3	12	1.6	1.2
MMSH	11	1.2	0.9	903	97.4	77.4	13	1.4	1.1
PMSH	1	0.2	0.1	584	99.3	77.9	3	0.5	0.4
Total	55	1.9	1.3	2774	96.3	65.2	51	1.8	1.2

Types of Intra-Utterance Switch To further understand details of the high intra-utterance code-switches in the data, three categories of intra-utterance CS identified (Muysken 1997, 2000) were employed: alternation, insertion and congruent lexicalisation. It can be recalled that alternation refers to the alternation to English clause or phrase which structurally differs from Mandarin, insertion refers to the insertion of English words or phrases without affecting the grammatical structure of the Mandarin utterance and congruent lexicalisation refers to the random interchanging of English and Mandarin words where the utterance conforms to a grammatical structure that is identical to English and Mandarin.

Table 9.3 shows that insertions make up the 96 % of intra-utterance CS. The other two types are relatively rare, with only 2 % alternation and 2 % lexicalisation. Similar readings were also observed when the types of intra-utterance CS are viewed against the total number of CS turns produced by the children. The informants commonly employ insertion when they code-switch (65.2 %), whereas alternation and congruent lexicalisation are rarely used by the informants (alternation ~1.3 %; congruent lexicalisation ~1.2 %). Thus, the children have a strong tendency to insert words or phrases into their Mandarin utterances when CS is employed as their communication strategy.

When viewed across home-language groups, insertion remains the most frequent among all four home-language groups as the percentages are beyond 90 %. However, the insertion among PESH children is the lowest as compared to the other three home-language groups.

This phenomenon becomes more prominent when their insertion is compared against their total CS turn, where insertion only constitutes 41.5 % of their total CS turns. Though lowest in insertion among the groups compared, PESH children used more alternation and congruent lexicalisation CS than the other three home-language groups. Indeed, PESH have the highest percentage of alternation and congruent lexicalisation CS among all four home-language groups, i.e. 5.2 % and 3.9 %, respectively. In short, children who have better competence in Mandarin (from the more Chinese-dominant families, CEI >0.5) tend to insert English words

or phrases into their Mandarin utterance when employing CS in their communication, whereas children with less Mandarin competence (from less Chinese-dominant families, CEI <0.5) tend to alternate to English phrases or clauses or interchanged words randomly between the two languages when they code-switch.

Grammatical Categories It is of interest to examine the common grammatical elements that children code-switch when they speak in Mandarin. The analysis of these common linguistic elements would reveal the common English repertoire that the children draw upon when they are speaking Mandarin. The analysis of what English grammatical elements are used in Mandarin communication will be good indicators in terms of Mandarin curriculum development, as their Mandarin equivalent should be addressed in Chinese language teaching. For this analysis, the categories developed by Poplack (1980) were used, following grammatical categories or word-classes, i.e. nouns, verbs, adjectives, preposition, conjunction and others. The grammatical categories are annotated in each insertion CS turn by percentage.

It can be seen from Table 9.4 that the four most common grammatical categories are nouns (48 %), followed by conjunction (21 %), others (19 %) and then verbs (8 %). Adjectives, adverbs and prepositions have rather low percentages.

When viewed across home-language groups, PESH children switched to use more English nouns (51 %) and verbs (12 %), whereas PMSH children switched to using more nouns (45 %) and conjunctions (38 %). As for the other two home-language groups, they have more CS for nouns and conjunctions, but they also have slightly more switches for verbs like their PESH counterparts.

When content words (i.e. nouns, verbs and adjectives) and function words (i.e. conjunctions, prepositions and adverbs) were examined, two trends were observed. Firstly, children who came from more English-speaking homes are more dependent on their English for content words as compared to children from more Mandarin-speaking homes (67 % PESH, 61 % MESH, 56 % MMSH and 51 % PMSH), whereas children from more Mandarin-speaking homes are more dependent on their English repertoires of function words (10 % PESH, 18 % MESH, 26 % MMSH and 38 % PMSH). These trends show that children from MESH may be short of basic building blocks (i.e. the vocabulary of content words) when expressing in Mandarin, whereas children from MMSH are short of conjoining materials (i.e. vocabulary of function words). Examples are shown in Table 9.5.

In the examples above, the diversity of CS for noun, verb and adjective items generally reflects certain lexical gaps in the children's Mandarin lexicon. This gap

Table 9.4 Common linguistic content of CS

Groups	Ins CS	Noun	Verb	Adj.	Conj.	Adv.	Prep.	Others
PESH	595	50.9	11.8	3.9	6.9	2.4	0.7	23.5
MESH	770	47.5	9.5	4.0	14.8	1.4	1.6	21.2
MMSH	927	47.0	6.7	2.5	24.8	0.2	0.6	18.1
PMSH	588	44.9	4.4	1.4	37.9	0.0	0.0	11.4
Total	2880	47.5	8.0	3.0	21.1	0.9	0.8	18.7

Table 9.5 Examples of common linguistic content code-switched

	Words being code-switched
Nouns	Auntie, apple, Bukit Batok, bus, favour, foodcourt, hawker centre, NTUC, power, rabbit, restaurant, sausage, shopping, Star Cruise, tissue paper, UNO, wall, zebra
Verbs	Carry, celebrate, find, hook, moving, poke, push, stay, stretch, stuck, take
Adjectives	Brown, chubby, cute, deep, easy, invisible, long, messy, orange, purple, poisonous, smelly
Conjunctions	If, but, and
Adverbs	Then
Prepositions	After, near, on, to, under

is indeed not surprising because children's lexicon at this age (or even anyone's at any given age) is bound to lack certain lexical items. What is worth noting here is that children (and only bilingual children) are able to overcome such gaps by drawing on lexical items in their alternate language resource (English). Another point to be noted, according to our observation, is that proper names for specific referent and local context have contributed partially to the high percentage of CS for nouns. This is because such terms are usually conveyed in the daily Singaporean life in English and their Mandarin equivalents are rarely known and used, for example, UNO, Garfield, Star Cruise, NTUC, etc.

Generally speaking, the findings on common CS linguistic contents show that content words like nouns, verbs and adjectives are grammatical categories that children switch in their Mandarin utterance. Among them, nouns have the highest tendency of being code-switched. This is probably not surprising as names of things are usually the largest group of words that a language learner has to conceive, and hence when the children are unable to name the things in Mandarin, they will try to seek alternatives in their other language to fill the lexical gap. Besides content words, we also found that function words like conjunction and conjoining adverbs are second in position among CS of the children. As noted in Goh (2012), the use of these words is linked to the descriptive or narrative task that the child is engaged in. It can be believed that such CS not only signifies the lexical gap of equivalent terms in their Mandarin lexicon but also involves the application or combination of conjoining words in both Mandarin and English to fulfill the particular descriptive task.

Summary All in all, the above findings show an undeniable relationship between CS and home-language background.

1. There are more CS instances from the two 'prominent' groups (PMSH and PESH).
2. More English-speaking children used *inter*-utterance CS more frequently, while the More Mandarin-speaking children produced more *intra*-utterance CS in their Mandarin communication. In addition, More English-speaking children used slightly more alternation and congruent lexicalisation CS than their Mandarin-speaking counterparts.

3. More English-speaking and More Mandarin-speaking children differ in their use of common grammatical categories. PESH children switch to use mostly nouns and verbs, whereas the other three groups switch to use mostly nouns and conjunctions.
4. The correlations between CS and home-language exposure indicate that Singaporean children, when speaking in Mandarin, code-switch to English to a certain extent and this may not be entirely due to deficiency in their Mandarin but probably a reflection of their bilingual cognition.

The implications of the findings for language teaching in the Singapore classroom are discussed later.

Study 2: Dual-Language Coding (Soh 1985)

As the learning of a foreign or second language, especially English and Chinese, has become a worldwide trend, a better understanding is useful of the processes involved in bilingual dual coding (Paivio and Desrochers 1980; Soh 2010a). It is also useful to find out how CS is influenced by moderator variables such as home-language background. Within this context, the study re-analyses and reinterprets data collected for a different purpose (Soh 1985). Taking the imagery-verbal connection for granted, this secondary analysis focuses on the connection between the two verbal systems and attempts to answer the following questions:

1. Among bilingual school children, to what extent are meanings learned in one language available in the other language at the word, phrase and text levels?
2. To what extent the abilities to code-switch at the phrase and test levels depend on the proficiency at the word level?
3. To what extent are the abilities in two languages correlated? And, to what extent the abilities to code-switch are correlated?
4. Which linguistic forms are easier to code-switch than others?
5. How are primary school students supported in their learning of the auxiliary (second) language?
6. To what extent do the students use their auxiliary language in the family and with peers?

It is believed that answers to these questions will be useful to designers of language curricula, language teachers teaching in a bilingual environment, assessment specialists developing language tests, parents who wish to see their children growing up bilingually and, of course, researchers interested in bilingualism.

Prior to the introduction in 1979 of the New Education System (Goh 1979), Singapore had two main types of schools. The Chinese schools were established and financed by the Chinese community with basically China-oriented curriculum. All subjects were taught by using Chinese, while English was taught as a standalone subject. Later, these schools obtained governmental grants and became

government-aided schools. On the other hand, the English schools were established by the then colonial government and later continued to be government schools after Singapore's Independence in 1965. In these schools, all subjects were taught using English, with Chinese as a stand-alone subject. There was a short transition period when efforts were made to integrate the two types of schools with the emergence of the integrated schools which housed an English Stream and a Chinese Stream under one roof. As time passed by, there was the need to fully unify the two Streams leading to the implementation of a national curriculum with emphasis on English, and all subjects except Chinese language were taught by using English, with some exceptional variation in terms of Civic and Moral Education.

Method

Students involved in the study were from two Chinese schools and two English schools. These schools were all above the national averages in the Primary School Leaving Examinations for the three years prior to participation. A total of 213 Primary 3–5 students were from the Chinese schools, and a total of 221 Primary 3–5 students were from the English schools. Admittedly, these students formed two convenience samples and no representativeness is claimed.

When assessing bilingual students on their proficiencies in their two languages, the convention is to test them using two different tests which not only differ in language but also in content. The students' bilingual ability is then inferred from comparing their performances on the two monolingual tests. A consequence of this monolingual approach is that the students are prevented from making use of what they have learned in the other language and there is no cross-reference between the languages, although they might do this covertly and subconsciously. Another consequence is that their performances in the two language tests are constrained by the different test content and, therefore, any observed difference in the two performances is an interaction between the test language and test content but not language ability alone. Such confounding by test content in a language test makes the interpretation uncertain as to the proportions of variances accounted for by the language and the content. This is a subtle point always overlooked in language assessment where the content effect is tacitly assumed to have been controlled. This leads to an underestimation of the correlation between abilities in the two languages.

In this study, a different approach to the assessment was adopted. This was achieved by using the same content for the various tests and only allowed the languages to vary among the different versions. Figure 9.3 shows the way the tests were derived.

As Fig. 9.3 shows, when a test has both its items and options in the same language, two conventional monolingual tests resulted, one for Chinese and the other for English. These monolingual tests are the conventional language tests but with the context effect controlled. When items and options are in different languages, two bilingual tests resulted, one for Chinese-English switch and the other for English-Chinese switch, again, with content effect ruled out.

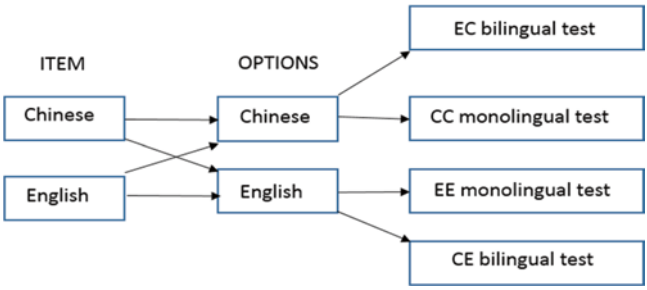

Fig. 9.3 Combinations of languages in test design

Kong Wah and Ali are _____. They always play together.

a) 兄弟

b) 姐妹

c) 朋友 *

d) 亲戚

Fig. 9.4 A sample item from the English-Chinese bilingual test

When a student takes the bilingual tests, he is faced by a question in one language (say, Chinese) but has to switch to another language (in this case, English) to evoke the correct answer in his mental lexicon from among the given options. If the meaning learned in one language is not available in the other language, he would not be able to find the correct answer. It is therefore argued that such bilingual tests are needed to actually assess the students' bilingual ability *bilingually* and the score thus obtained is a better measure of bilingual proficiency without the confounding of test content.

A sample item from the English-Chinese bilingual test is shown in Fig. 9.4. As shown therein, the item stem is in English and the options are in Chinese. Here, *Kong Wah* is the name of a Chinese boy and *Ali* that of a Malay. The options in Chinese characters mean (a) *brothers*, (b) *sisters*, (c) *friends* and (d) *relatives*. When answering this question, the student needs to infer from the item stem in English that they are friends and then code-switch to Chinese to look for the corresponding word (朋友). If the student understands the question but is unable to code-switch, the four options in Chinese will not be of any meaning to him, and he cannot answer correctly. Likewise, for the same item in the Chinese-English bilingual test, the process of CS is reversed.

Each of the four word tests has 65 multiple-choice items. The same approach of bilingual testing was applied at the phrase and text levels, though with lesser items.

There are 20 items for the bilingual phrase test, with 10 requiring English-Chinese CS and 10 Chinese-English CS. There are 10 items in the bilingual text test, with half of the items requiring English-Chinese CS and the other half requiring Chinese-English CS.

Analysis

Data for the monolingual and bilingual word, phrase, and text tests as well as the student survey were treated statistically by using appropriate analytical techniques which suited the nature of the data. As the students studied here did not form random samples of their respective populations, the use of the inferential *t*-test would violate the basic principle of its use as hence was avoided. Instead, group comparisons were made by using the descriptive effect size in terms of standardised mean difference (SMD) with the formula below and interpreted with reference to Cohen's (1988) criteria: 0.0–0.2, negligible effect; 0.2–0.5, small effect; 0.5–0.8, medium effect; and, 0.8 or above, large effect.

$$\text{SMD} = \left(\text{Group 1 mean} - \text{Group 2 mean}\right) / \text{Standard deviation}$$

Results

Word Tests Table 9.6 shows the performances on the monolingual and bilingual tests for the English and the Chinese groups of students. As shown therein, the English stream students scored practically equally well on all four tests, being able to answer correctly about 71 % of the 65 items of each test, on average. Their means for the two bilingual tests indicate that they were correct on 70 % of the items, and this suggests the extent with which what they knew in one language was available in the other language.

The Chinese Stream students' performances varied more among the four tests, with lower means when the tests involved English. Specifically, they were able to answer correct 59 % of the English-English monolingual test, 72 % of the Chinese-Chinese monolingual test, 58 % of the English-Chinese test and 64 % of the Chinese-English test. This pattern suggests that English set a ceiling especially when the questions were first encountered in English. Nevertheless, their performances on the two bilingual tests suggest that they were able to code-switch and thereby evoked the meanings of words across languages quite substantially.

When the two groups were compared on their means by way of effect size (SMD), the results show that they differed only slightly on the Chinese-Chinese test. This is somewhat surprising as it was expected that the Chinese stream students did better than did the English stream ones.

Table 9.6 Means and standard deviations for word tests

		English-English		Chinese-Chinese		English-Chinese		Chinese-English	
Group	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
English	221	46.5	9.37	47.5	9.01	45.3	10.48	46.4	10.96
Chinese	214	38.4	13.27	47.1	8.29	38.1	12.24	40.7	12.62
Difference		8.1		0.4		7.2		5.7	
Effect size		0.71		0.05		0.63		0.48	

On the other three tests involving English, the English Stream students did better than did the Chinese stream students as would be expected, since this is the latter groups' weaker language. The mean difference varied from 5.7 (Chinese-English) to 8.1 (English-English). The means for the two bilingual tests also suggest that it was easier for the English stream students to switch from Chinese to English more than the other way round, although the mean difference is small. Nonetheless, the three effect sizes are of a medium to large magnitude in favour of the English stream students.

Of special interest to this study are the performances on the two bilingual tests of the two groups of students. Three points are worthy of mention. First, as can be seen from Table 9.6, the English Stream students seemed to be more adept at Chinese-English switch than at English-Chinese switch, but the SMD = 0.10 shows there is actually a trivial difference. Secondly, the Chinese Stream students tended to be more adept at Chinese-English switch than at English-Chinese switch (SMD = 0.21), but this is only a small effect. Thirdly, while the English stream students were more adept than the Chinese stream students at both directions of CS, the SMD = 7.2 for English-Chinese switch is greater than the SMD = 5.7 for Chinese-English switch, indicating that it was easier for the English stream students to code-switch from English to Chinese than the other way round.

Phrase Test As shown in Table 9.7, the English stream students scored 75 % of the 20 items of the phrase test, whereas the Chinese Stream students scored only 60 %. The SMD = 1.45 indicates a very large effect. Since all items of the phrase test involved English, that the Chinese stream students (who were generally weaker in English) did not do as well as their English Stream counterparts is not surprising.

It is reasonable to expect phrase test performance to depend on the performance in monolingual word tests, since the ability to function at the higher levels of phrase is logically dependent on lexical knowledge. Table 9.7 shows the correlation coefficients which suggest that the English Stream students relied on their English and Chinese abilities to the same extent when taking the phrase test. However, the Chinese Stream students depended much more on their English ability than on Chinese ability when taking the phrase test.

Text Test As shown in Table 9.8, the English Stream students scored 75 % of the 10 items of the text test, whereas the Chinese Stream students scored only 64 %. The SMD = 0.51 indicates a medium effect size. Like the phrase test, since all items

Table 9.7 Means, standard deviation and correlations of phrase test

Group	N	Phrase test			
		Mean	SD	r (P-EE)	r (P-CC)
English	212	15.1	1.56	0.650	0.630
Chinese	176	12.2	2.44	0.567	0.337
Mean difference		2.9			
Effect size		1.45			

Note: *E* English, *C* Chinese, *P* phrase test

Table 9.8 Means, standard deviation and correlations of text test

Group	N	Text test			
		Mean	SD	r (T-EE)	r (T-CC)
English	212	7.5	1.96	0.605	0.508
Chinese	176	6.4	2.39	0.598	0.413
Mean difference		1.1			
Effect size		.051			

Note: *E* English, *C* Chinese, *P* phrase test, *T* text test

Table 9.9 Intercorrelations among word tests

Group	N	EE-CC	EC-CE
English	221	0.895	0.902
Chinese	214	0.598	0.889
Combined	435	0.761	0.896

Note: *E* English, *C* Chinese

of the text test involved English, the Chinese Stream students (who were generally weaker in English) did not do as well as their English Stream counterparts is not unexpected.

It is reasonable to expect text test performance to depend on the performance in monolingual two word tests, since the ability to function at the higher levels of text is logically dependent on lexical knowledge, not to mention knowledge of grammar. As the correlation coefficients in Table 9.8 suggest, the English Stream students relied on their English ability more than their Chinese ability when taking the text test. The same tendency was found for the Chinese Stream students. Note that the correlation coefficients are both lower for the Chinese Stream students than they are for the English Stream students. This indicates that the ability to code-switch at the text level was less predictable for the Chinese Stream students.

Correlations As shown in Table 9.9, the correlations between the two monolingual word tests are r=.90 for the English Stream but only r=.60 for the Chinese Stream students. When the groups are combined, it is r=0.76. These correlations are on the high side when seen against some studies. For instance, in China, Jiang (2011) reported r=.55 between English and Chinese proficiencies and even lower

with TOEFL reading (r = .24). In a review by Yamashita (2002) of five articles appearing from 1989 to 1999, correlations between L1 and L2 comprehension vary between r = .17 and r = .64. One plausible explanation is that the two monolingual tests in the present study have the same content. Thus, comparing the r = .90 of this study and r = .64 of Yamashita, content accounts for 40 % variance difference.

Secondly, the correlations between the two bilingual word tests are very high: r = .902 for the English Stream students, r = .889 for the Chinese Stream students and r = .896 when the two groups are combined. This pattern of correlations suggests that the students were able to code-switch with high efficacy by evoking meanings learned in one language using the other language. This supports the basic tenet of the present study that cross-language referencing is not only possible but also instructionally beneficial. Similar results were found for the phrase and text tests, although the effects are not as prominent as the word test, due mainly to the differences in test lengths.

Linguistic Forms The four word tests each consist of words of different linguistic forms. There are 15 nouns, 17 verbs, 17 adjectives, 10 pronouns and 6 adverbs. Shown in Table 9.10 are the per cent scores for the bilingual tests obtained by the English Stream and Chinese Stream students. For the English Stream students, CS from English to Chinese was easiest for nouns, followed by adverbs and then verbs, but adjectives and pronouns were most difficult. The pattern varied slightly when switching from Chinese to English. However, the ranks correlate with a correlation rho = 0.9 between the two patterns of ease in CS. To some extent, this pattern, especially for nouns and verbs, is consistent with those found by Hammink (2000) and Foo (2011) cited earlier.

For the Chinese Stream students, the pattern of ease in CS is the same as that for the English Stream students for the English-Chinese bilingual test, and the same is true for the Chinese-English test; hence, the rho = 1.0.

Home Support

It is a forgone conclusion that home support plays an important role in children's language acquisition. This applies to the development of the first language and perhaps is even more important for the learning of second language. To find out how the students were supported for language learning, they were asked questions on specific behaviours of their mothers with regard to the auxiliary language at home. Understandably, mothers play a more prominent role in children's language development (hence mother tongue), and the survey focused on them.

Auxiliary language here refers to Chinese for the English Stream students and, correspondingly, English for the Chinese Stream students, since the languages are the 'second languages' in their respective curriculum then, i.e. before the implementation of the unified national curriculum in which English is administratively labelled as the first language and Chinese the second language.

Table 9.10 Per cent scores for linguistic forms

	English stream		Chinese stream	
	E-C test	C-E test	E-C test	C-E test
Nouns	82 (1)	86 (1)	72 (1)	78 (1)
Verbs	77 (3)	82 (2)	69 (3)	70 (3)
Adjectives	71 (4)	72 (4)	63 (4)	64 (4)
Pronouns	61 (5)	63 (5)	56 (5)	53 (5)
Adverbs	81 (2)	81 (3)	71 (2)	73 (2)
Correlation	0.90		1.00	

Note: Figures in parentheses are ranks based on the per cent scores

Twenty Yes-No questions were asked about the mother's specific behaviour which might have an impact on the students' learning of the auxiliary languages. The survey results were presented in Table 9.11.

When the two groups of students were combined, there are seven maternal reinforcing behaviours which had endorsements of around 70 % or more. As gathered from the first seven items in Table 9.11, the mothers supported their children by some forms of metacognitive strategies such as reminding, requesting, scolding, praising, enquiring, involving and allowing TV watching. These are followed by some indirect engagements with 50 % or more (items 8–13). These supposedly intensified the students contact and use of the auxiliary languages and have some element of being social in nature. The remaining items were endorsed by 50 % or less, and these are cognitive in nature, including asking questions, reading of storybooks and newspapers and assisting in homework, in the auxiliary languages.

When the two groups of students were compared, they differed on 10 items, nine in favour of the English stream students and one the Chinese stream students. Thus, the English Stream students had greater support for learning Chinese than did the Chinese Stream students for learning English. The items for which differences were found spread over the whole range of endorsement. It appears that the English stream students generally received greater home support than did the Chinese Stream students. This could well be a factor leading to the better performances in CS tests of the English Stream students as reported earlier on the various tests (Tables 9.6, 9.7, 9.8, 9.9, 9.10, and 9.11).

Use of Auxiliary Language

Although the adage of '*Practice makes perfect*' may not be true for all learning, it surely is for language learning. Common sense and empirical evidence both suggest that language as skills (versus language as knowledge) can be perfected only by regular use. It is therefore useful and interesting to find out how often the students used their respective auxiliary (second) language with family members and peers.

As Table 9.12 shows, for the English stream students, their auxiliary language (Chinese) was used by 49–71 % in communication with parents and siblings. On the

Table 9.11 Home support for auxiliary language

Does your mother do this?	All students	English stream	Chinese stream	Diff.	Chi-square	p
1. Tells you that Chinese/English is important	88	81	95	−14	21.627	Sig.
2. Tells you to learn more Chinese/English	86	84	89	−5	1.906	NS
3. Scolds you for getting poor marks in Chinese/English tests	80	78	82	−4	0.802	NS
4. Praises you for getting good marks in Chinese/English tests	77	88	65	23	32.146	Sig
5. Asks you what you do in Chinese/English lessons	74	81	67	14	3.073	NS
6. Asks you about Chinese/English words on signboards	74	69	80	−11	5.842	NS
7. Lets you watch TV programmes in Mandarin/English	73	78	68	10	4.524	NS
8. Allows you to listen to Mandarin/English programmes over the radio	64	74	54	20	18.518	Sig.
9. Tells you to make friends with people/pupils good in Chinese/English	64	66	62	4	0.900	NS
10. Tells you to read Chinese/English storybooks	59	66	51	15	12.074	Sig
11. Takes you to the cinema to see Mandarin/English pictures	56	65	47	8	13.239	Sig.
12. Tells you to borrow Chinese/English storybooks	52	61	43	18	13.260	Sig.
13. Asks you to write something in Chinese/English	51	68	34	34	47.610	Sig.
14. Asks you how to say something in Mandarin/English	50	60	39	21	17.857	Sig.
15. Asks you to read Chinese/English newspapers	48	66	30	36	52.939	Sig.
16. Gives you Chinese/English storybooks	41	46	36	10	3.774	NS
17. Helps you to do your Chinese/English homework	38	39	36	3	0.168	NS
18. Tells you not to make friends with pupils poor in Chinese/English	20	16	24	−8	4.258	NS
19. Teaches you to sing Mandarin/English songs	19	26	12	14	12.994	Sig.
20. Asks you to sing Mandarin/English songs for her	14	13	15	−2	0.166	NS

Notes: (1) This version was for the English stream students to whom Chinese was the auxiliary language. (2) All chi-squares were calculated with d.f. = 1, and the critical value is 6.635 for statistical significance at the $p = .01$ level

Table 9.12 Use of auxiliary language with family members

	English stream %	Chinese stream %	Difference	Chi-square	p
Student to mother	68	46	22	20.36	Sig.
Mother to student	65	39	26	28.62	Sig.
Between parents	49	36	13	7.19	Sig
Student to siblings	68	65	3	0.41	NS
Siblings to students	71	61	10	4.57	Sig
Among siblings	68	65	3	0.41	NS

Note: Percentages are for those who endorsed v*ery often* and s*ometimes* combined

Table 9.13 Use of auxiliary language with friends

	English stream %	Chinese stream %	Difference	Chi-square	p
Student to school friend	85	41	44	90.25	Sig.
School friend to student	81	45	36	57.74	Sig.
Among school friends	60	43	17	13.28	Sig.
Student to home friends	71	50	21	21.50	Sig.
Home friends to student	70	51	19	15.52	Sig.
Among home friends	66	53	13	7.240	Sig.

Note: Percentages are for those who endorsed *very often* and s*ometimes* combined

other hand, for the Chinese stream students, English (their auxiliary language) was used only by 36–65 %. The differences vary from as little as 3 % to as much as 26 %. Four of the six chi-square tests results are statistically significant. In short, in the family, the English Stream students used Chinese much more often than did the Chinese Stream students use English. The greater differences are found with the parents, and this may be caused by the parents' language and education backgrounds. Such difference can be expected to have an influence on the students' abilities and motivation in the two languages as well as the ability to code-switch.

As Table 9.13 shows, for the English Stream students, the auxiliary language (Chinese) was used by 60–85 % in communication with peers. On the other hand, for the Chinese Stream students, English was used by only 41–53 %. The differences vary from as little as 13 % to as much as 44 %. All six chi-square test results are statistically significant. Thus, the English Stream students used Chinese much more often than the Chinese Stream students used English. The tendency is that the greater differences are found with friends in school than with friends at home. This indicates that the English Stream students got more practice of the auxiliary language in school than did the Chinese Stream students. The same condition prevailed in the home environment as well, though somewhat less. Again, such difference can be expected to have an influence on the students' abilities and motivation in the two languages as well as the ability to code-switch.

Summary With reference to the research questions mentioned earlier for this study, the findings are summarised as follows:

1. The above findings point to a considerable overlap in the meaning learned between the two languages of bilinguals. This cross-language overlapping is too sizeable to ignore and is consistent with the Paivio-Desrochers bilingual dual-coding theory.
2. The abilities to code-switch at the phrase and text levels do depend on the proficiencies in the two languages. However, for the English Stream students, language proficiencies at the word level contribute to around 40 % of the ability to code-switch at the phrase and text levels. For the Chinese Stream students, it is about 15 %. It stands to reason that without word knowledge, understanding of CS at the phrase and text level will be difficult.
3. The correlations between the bilingual measures are very high, indicating shared variance between 79 % and 81 %. As alluded to above, there is considerable overlap between English and Chinese proficiencies at the word level. The extent of such overlap is much greater that usually found in the pertinent literature. This finding of considerable overlap between English and Chinese deserves greater attention than it has been accorded to and has instructional implications.
4. CS is not of equal ease for different linguistic forms. In spite of the stream of the students, nouns and verbs, and perhaps adverbs, are easy for CS, whereas adjectives, pronouns and prepositions are harder. This finding in partial echoes with Goh (2012), as he also found that nouns and verbs are most commonly code-switched; however, Goh did not find significant CS for adverbs but instead found higher CS for conjunctions. This finding of high CS for nouns and verbs is to be expected as some linguistic forms are encountered more frequently and more concrete than others.
5. Parents are generally supportive to their children's learning of auxiliary languages. However, they are able to provide indirect support (such as reminding children to learn and emphasising the importance of learning) but are less likely to give direct support in the learning process. Parents of the English Stream students are more supportive than those of the Chinese Stream students.
6. A problem of second language learning is the linguistic discontinuity between the school and the home. It is a common sense that when a language learned at school is also spoken at home, there is a continuity that makes the two experiences mutually reinforcing. Thus, the language learning in the contrived environment of school is reinforced by the more natural language acquisition at home, resulting in higher proficiency. The absence of such a favourable condition could well be the root cause of the problem of learning a second language.
7. The English Stream students used the auxiliary language (Chinese) with their mothers more than do the Chinese Stream students. The difference in the use of the auxiliary language with siblings is much less between the two streams. At the same time, the English Stream students used the auxiliary language with their school friends much more often than do the Chinese Stream students. The difference in the use of the auxiliary language with friend at home is much less between the two streams. The interaction of students with their siblings provides an additional platform for practising the language in a personally meaningful way. These two conditions are found to be more available to the English Stream

students than they are to the Chinese Stream students, thus contributing to the differences between the two groups repeatedly found in the analysis of test and survey data of this study.

Implication for Teaching Chinese Language in Singapore

Thus far, this chapter has attempted to present the CS phenomenon of Singaporean children with a new perspective. From the international literature, it has been shown that CS is not simply code confusion or language deficit, it holds certain pragmatic functions and it indeed follows certain underlying cognitive principles (such as Paivio's dual-coding theory and the Paivio-Desrochers' bilingual dual-coding theory). From the two local studies presented here, it has been shown that Singaporean preschool and primary children's CS has strong relationship with their home-language exposures. More important is the two languages of Singaporean Chinese children are indeed related in their mind, although linguistically they are considered as being quite different, belonging to different language families.

Generally, the value of the present article lies with providing a historical as well as more current perspective which enables a comparison of the past and the present with a view to the possible future. It is a worthwhile effort to take a retrospective look at what was found happening in the past and try to foretell what can and need be in the future. As illustrated above, it has been noted that sizeable commonality exists between a bilingual pupil's two languages and that a bilingual pupil can code-switch with reasonable ease from one language to the other. This has implications for bilingual curriculum and instruction methodology. Perhaps, what ought to be added to these are implications for assessment and training of language teachers.

Curriculum Design To capitalise on code-switching for more effective teaching of Chinese language, especially to students who do not speak the language at home, there is a need to ensure coordination between the curricula of the two languages. This was suggested by Soh (1985: 101). In terms of curriculum materials, this indicates the need to develop *correlated* language syllabuses by taking into consideration the communality between languages as well as language-specific structure and the need to identify non-linguistic content which can be conveniently coded into two languages. Traditionally, language curricula (syllabuses) for languages, even in a bilingual education system like that of Singapore, are designed by specialists for their respective language independently of any other language. To maximise the benefit of code-switching, the two languages need be coordinated to some extent.

Admittedly, beyond vocabulary, the linguistic content may be more difficult to coordinate, as each language has its own sequence of learning when some learning points need to precede others and the patterns may not be the same for the two languages. However, the coordination of the nonlinguistic content should be easy. Linguistic content cannot be learned without the non-linguistic content serving as the vehicle and has to be nested in chosen topics. As long as the topics for writing

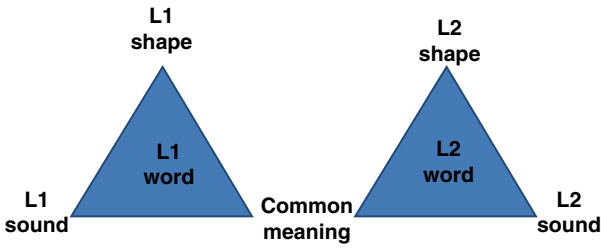

Fig. 9.5 Shared meanings between languages

language texts are within the cognitive level of students, any topics will do. Thus, at the least, language curricula for the two languages need to overlap to a large extent. This enables CS to be employed for effective language teaching, by which the students need not learn the nonlinguistic content all over again; all the teachers need to do is to evoke the relevant concepts of chosen words in the first language and help the students to learn the new labels for the concepts. As depicted in Fig. 9.5, the process of learning new words can be a shortcut by capitalising on the common meanings shared between two languages (Soh 2010a), leading to more efficient learning and less frustration for the second language learners. By capitalising on accessing word meanings across languages, learning process can be short-circuited and thereby save time and energy.

A word of caution, though, if the two language curricula overlap too much as to become almost identical in non-linguistic content, boredom may set in to make the learning of the second language so monotonous that it detracts than attracts. Besides, for the teaching of Chinese in the Singapore context, the inculcation of Chinese culture and values is a second objective. For this, there must be room reserved for this objective. Moreover, some cultural concepts and values may just have no equivalents in the other language (English) or may be so difficult to translate where CS is not feasible. Thus, the coordinated curricula should not be an exact translation of the other.

Language Instruction Language teachers naturally use the language they are trained to teach and avoid using another language in their lessons. They do this, maybe, to maintain a professional identity of being teachers of a particular language and to comply with the directive to stay within it since their countries may have rules regarding the use of a different one in language lessons. What then can they do when explaining new or difficult words? If the word is a label of an object, the teacher may use its actual object, drawing or photo to illustrate. If the word refers to an action, the action may be demonstrated. In such cases, cognitively speaking, the teachers use cross-modal *translation* from verbal input to visual input. If the word is an abstract concept, then, many other words may be used. In this case, the new word is *translated* into more elaborated and presumably simpler and known words or concept, i.e. the dictionary method.

This last method can be problematic as the words and concepts used for explanation (*translation*) may not be actually simpler or better known to the students. For example, 尴尬 (awkward) is explained as 处境困难 (difficult situation) and 不好处理 (not easy to handle) and倔强 (stubborn) as 刚强不屈 (strong-willed and unyielding) in a dictionary commonly used in Singapore. Here, the students are assumed to know already such words as 处境 (situation), 处理 (handle), 刚强 (strong-willed) and 不屈 (unyielding). The problem is that the students are probably as unfamiliar or even more so with these 'explaining' words as those they are to explain. In Chinese language textbooks, such verbal explanation is a regular feature, and students are expected to remember the word meanings and will be tested. It is obvious that this within-language dictionary approach adds to the problem of learning more than solving the problem.

However, CS can help and the students can learn faster. This can be achieved by (1) the teacher referring to English equivalents, (2) the students using a bilingual dictionary or (3) the teacher demonstrating to the class using Google Translate. Students are more likely to know already such English words as *awkward* (尴尬) and *stubborn* (倔强), and the problem is solved immediately by referring to the students' past knowledge already learned in English. Two additional advantages of this bilingual approach via CS are that (1) there is less frustration to both the students and the teacher and (2) instruction time is used more economically. Not capitalising on CS, the teachers deprive themselves of a useful and even powerful tool for solving the word-meaning problem of language teaching. And, as implied by the findings above, this approach can also be applied to the phrase and test levels, perhaps to a less degree because of the more complex nature of phrases and texts.

Of course, the teachers need be cautioned not to overdo CS lest the lessons become translation lessons which serve a totally different purpose. The teachers need to be able to discern when to and when not to code-switch. This requires the teachers to be familiar with the students' language proficiencies in the two languages and also with the two language curriculum, especially if a coordinated one is available. Thus, teachers can wisely mix the within-language approach and CS according to the demands of the learning situations. However, code-switching need not be the last resort used only when other methods have been exhausted and failed. On the contrary, it can be the first-line attack of the problem, capitalising on the students' language background and past learning.

Language Assessment Bilingual students' abilities in the two languages are traditionally assessed by two different language tests which usually differ in content and format and are likely to have been designed by different teachers. With such differences, the relationship between the students' bilingual abilities would have been underestimated. When the students take the two monolingual tests, they are not required to make use of the other language. As has been suggested (Soh 2010b, 2012), the results of such assessment do not necessarily indicate the students bilingual ability since the languages function independent of each other rather and not interactively.

Chinese Language teachers need to continue designing and administering monolingual Chinese tests. This provides them with information needed for the evaluation of the students' progress in the learning of Chinese and diagnoses their learning difficulties. They also need to beef up their assessment literacy so that they can do his part of their professional responsibilities with deeper understanding and greater efficiency.

Over and above monolingual testing, the Chinese Language teachers can also design Chinese-English bilingual tests, all by themselves or, better, in collaboration with English Language teachers. Doing this will enable the teachers to find out how well students are able to use what they have learned in one language to answer questions posed in another. The information will help the teacher adjust her use of CS in subsequent lessons.

Assessment has a motivating effect in the Singapore context where assessment is taken very seriously (perhaps, too seriously); taking bilingual tests will encourage English-speaking students to use CS as a language learning strategy to enhance their learning of Chinese, especially where word meanings are concerned thereby strengthening their vocabulary. Bilingual tests will help the students see that the two languages are related and not unrelated as always assumed to be.

Implication Teacher Training As a corollary of bilingual curriculum, teaching and assessment, bilingual teachers are needed. Ideally, the teachers should be balanced bilinguals who can function with ease in both languages. This however does not seem to be an imperative conditions; as long as the Chinese Language teachers are sufficiently proficient in English, they should be able to make reference to English in the course of instruction. And, this seems to be the case of the younger generation of Chinese Language teachers.

Admittedly, those comments cited above were made in the context 30 years ago when the Chinese Language teachers themselves were once Chinese stream students and bilingual ability was hard to come by. Therefore, the bilingual approach to teaching Chinese language might not be practical on a reasonably large scale and had to wait. Now, 30 years have passed and the situation is different. The younger generation of Chinese Language teachers came out from bilingual education system and are facile in both languages, and some are even more proficient in English than Chinese while having sufficient mastery of Chinese to be teachers. Thus, it is reasonable to suggest that the time is ripe for the bilingual approach involving CS to teach Chinese language, especially to those students who come from English-speaking homes and find learning the language not only a chore but also a bore. By having bilingual Chinese Language teachers teaching, the students will find learning Chinese not so out of sync with their daily life and can learn more effectively, leading to better attainment and stronger motivation.

Although the condition nowadays is more favourable for the bilingual approach to teach Chinese, certain actions are needed in terms of teacher training. Firstly, Chinese Language teachers need be convinced that the bilingual approach involving CS will help solve some learning problems, especially benefiting students from non-Chinese-speaking homes. Moreover, so doing is consistent with educational

principles of making good use of students' knowledge and ability with regard to language learning. Thirdly, they need guidance to make judicious decisions regarding when and to what extent CS can be used to maximise the benefit so as to avoid inadvertently turning Chinese Language lessons into English or translation lessons. Fourthly, they need be familiarised with the coordinated language curricula, when available, so that they know well beforehand in which topics of the language texts CS is possible and beneficial to their students.

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