

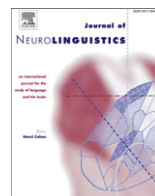


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The use of the Bilingual Aphasia Test with a bilingual Mandarin–New Zealand English speaker with aphasia

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ABSTRACT

This is a single case study of a 74 year old bilingual Mandarin–New Zealand English speaking man with aphasia. We compare his language ability on the Bilingual Aphasia Test with norms for New Zealand English speakers and the original BAT norms. There is a large and growing population of Chinese in New Zealand. The impact of communication disorders in this group has been minimally investigated in the literature. We investigate the linguistic and psychosocial consequences of living with bilingual aphasia.

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1. Introduction

New Zealand is a small island nation in the southern Pacific Ocean with a population of 4.4 million. English is spoken by approximately 98% of the population. Along with New Zealand Māori (4.5% speakers) and New Zealand Sign Language (<1% speakers) it is one of the three official languages of the country (Statistics New Zealand, 2010). New Zealand's changing ethnic composition is reflected in the increasing diversity of languages spoken. The number of multilingual people has continued to increase. Between the 2001 and 2006 censuses (the most recent one available), the number of multilingual people has increased by 19.5% (671,658) (Statistics New Zealand, 2010).

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1.1. *New Zealand Chinese*

Based on the 2006 Census ethnic Chinese is one of the largest and fastest growing immigrant groups in New Zealand with a 40% increase from the previous Census in 2001 (2001 = 105,057; 2006 = 147,570). Population estimates predict that this growth will continue exponentially and the New Zealand Chinese population is projected to reach 790,000 by 2026 (Statistics New Zealand, 2010). Between 2001 and 2006, the number of people in New Zealand able to speak Mandarin increased from 26,514 to 41,391.

The census data show that of the Chinese ethnic group, around 80% speak Mandarin as their native language or one of their languages. With the recent policy changes in China (Wang & Phillion, 2009), where Mandarin has been established as the official language of the country and all the compulsory schooling, official, political, judicial and economic systems in Mandarin, it is evident that the status of Mandarin has shifted and will impact on Chinese immigrants to New Zealand and other countries.

1.2. *Stroke in New Zealand*

Almost 7500 New Zealanders each year experience a stroke – as many as 20 people a day. At least 50% of these will die or be dependent on others for care one year after the event (Gommans et al., 2003). For many people who have had a stroke, the reliance on others for care is a consequence of having aphasia which renders them unable to live independently. In 2001, there were an estimated 32,000 survivors of stroke in New Zealand, with stroke being the greatest cause of disability in older people (Tobias, Cheung, & McNaughton, 2002). Given the projected increases in the population of older adults (Statistics New Zealand, 2010; WHO, 1999) this figure is expected to rise considerably in the next 20 years.

Approximately one quarter of people who have had a stroke will be left with chronic aphasia (Kauhanen et al., 2000) which means that around 16,000 people in New Zealand are living with aphasia (though the exact number is unknown). Despite this large number, relatively little is known about the impact of living with aphasia, either from the perspective of the person with aphasia or their family/caregivers. There is extensive research about changes in the motor, sensory, vision, cognition, and emotional abilities of stroke survivors (Kase et al., 1998; New Zealand Stroke Foundation, 2007) and their care needs in the community (Bakas, Austin, Jessup, Williams, & Oberst, 2004), but more research is needed to investigate the psychosocial consequences of living with aphasia in New Zealand. Such research is difficult if researchers and clinicians lack assessment tools appropriate for speakers of the different languages that are represented in the community.

1.3. *Differences between Mandarin and English*

It is widely assumed that when speaking another language the main problem for a bilingual speaker arises when the second language requires certain features that are not found in one's own language (see Schmitt & McCarthy, 1997). This being the case, we would expect a Mandarin speaker to have some difficulty when speaking English due to the relatively more complex phonological, morphological, and syntactical systems in English compared to Mandarin. With respect to phonology there are noticeable differences between Mandarin syllables ending only in a nasal and the final sounds of English (fricatives, affricates, plosives, and approximates). Morphologically, Mandarin is rather more straightforward than English. It is an isolating language in which each word generally only contains one morpheme (Li & Thompson, 1989). This means that functions carried out by inflections in English are formed other ways in Mandarin. The most common morphological processes for word formation in Mandarin are reduplication, affixation, and compounding. In terms of syntax, the somewhat less rigid word order of Mandarin creates problems when speaking English. Li and Thompson (1989) suggest that in Mandarin it is the meaning (e.g. topic prominence) not the grammatical function that governs the order in which basic words and phrases occur. Additionally, the use of copulas, articles and prepositions are difficult for Mandarin speakers when conveying information in English. Mandarin does not mark tense (only aspect). Tense is not specifically assessed in the BAT, however it should be considered when speaking with or instructing clients who are Mandarin speakers. If we add to these

problems the complication of aphasia (in particular the word finding difficulty inherent in all aphasia subtypes and severity) it quickly becomes evident that the assessment of bilingual aphasia is indeed one requiring specific sensitivity and skill.

1.4. *Bilingual aphasia*

Much has been written about bilingual aphasia, in particular by Michel Paradis, who has published numerous journal articles, book chapters, books and assessments and influenced countless other researchers and clinicians. He could arguably be called the modern “father of bilingual aphasia”. We do not need to re-trace the steps of this extensive literature here. Recently, [Lorenzen and Murray \(2008\)](#) comprehensively reviewed the theoretical and clinical factors of bilingual aphasia. Their review of the literature identified a distinct lack of what they called “empirically validated management techniques”. They expressed particular concern about the decision of determining the language to target, identifying the most vulnerable aspects of languages (to impairment and treatment) and utilizing language similarities.

In his wide-ranging study of the recovery of 132 people with bilingual aphasia, [Paradis \(2001\)](#) identified four different patterns with “Parallel recovery” being the most common (seen in 61% of participants), followed by “Differential recovery” (18%), “Blended recovery” (7%) and “Selective recovery” (5%). Anecdotal media reports of recovery from bilingual aphasia suggest that recovery may be better for the first language in people who are serial bilinguals. The current study aims to contribute to the discussion of the multiple factors influencing bilingual aphasia using a single case study of a Mandarin-English speaker with aphasia. It explores performance on the BAT of a 74 year old man with mild Mandarin-New Zealand English bilingual aphasia in order to determine the value of assessing in both languages using the same assessment, to compare errors in the two languages, and to contribute to the growing body of literature on the use of the Bilingual Aphasia Test (BAT, [Paradis, 1989](#)) in different language pairings.

2. Method

2.1. *Participant details*

The participant in this study (CL) was a 74 year old man from mainland China. He was born in Guan xi province in 1935 where he spoke Mandarin and Guan xi dialect. He lived there until moving to Hong Kong in 1947 (aged 12 years) where he attended high school and university. He was a junior high school teacher in Hong Kong for 30 years where he married a local woman and spoke predominantly Cantonese, but also learned and, on occasion, used English. In July 1997 there was a transfer of sovereignty over Hong Kong, from the United Kingdom to the People's Republic of China. This was known as “the Handover” (or “the Return” in China) and required all government employees in Hong Kong (including school teachers) to learn and use Mandarin in all official capacities (e.g. as the language of instruction in school). CL's competence in Mandarin was sufficient for him to teach Mandarin as a subject to the junior high school students. CL moved to New Zealand in 1998 and attended English language group classes twice weekly for six months. He lives in his own home with his Mandarin-, Cantonese- and English-speaking wife and they have a large supportive community of Chinese friends and local services (e.g. drycleaner, supermarket, newspapers, bank, post office).

[Grosjean \(1989\)](#) described bilingualism as speaking two or more languages in daily life. He goes on to say that people use different languages for different purposes or life domains and consequently have different levels of proficiency within their languages and across domains. There are of course factors such as age (pre- or post-adolescence), sequence and method of acquisition as well as personal and social factors (cultural identity) that will impact on language proficiency in the two languages. In the case of CL, there have been numerous influences in his acquisition of language, including the move as an adolescent from China (where he spoke Guan xi dialect) to Hong Kong (where he spoke Cantonese and English), the mandatory (re)introduction of Mandarin after the transfer of sovereignty and then his decision to move his family to New Zealand where the majority of people speak English. Māori was recognized as an official language in New Zealand in 1987 when the Māori Language Act was passed.

Māori words often appear in New Zealand English, however, the 2006 Census found that only 4% of the total New Zealand population could hold a conversation in Māori about everyday things. Hence, English is currently the language most commonly spoken in New Zealand.

Table 1 below summarizes CL's use of the four languages he has learned throughout his life. Of particular note are the self-rated language proficiency and preference scores. Guan xi dialect (his "mother tongue") is the only language he no longer uses and is his least preferred and the one he describes as his least proficient.

Table 1

Summary table of languages used (as reported by CL and his wife) and self-rated proficiency and preference.

Language	Guan xi dialect	Mandarin (Putonghua)	Cantonese	English
Age learned	Birth	About 20 years of age	About 12 years of age	About 15 years of age
How learned	Acquired at home	Exposed in childhood, learned formally as an adult, immersion	Exposed at school, learned formally	Exposed at school, learned formally as an adult
How language used	No longer used	Used frequently with friends, when watching television and when reading books/newspapers	Used frequently at home with family and friends	Used in formal contexts (church, hospital)
Proficiency	Minimal	High	High	High
Language preference	4	2	1	3

2.2. Cerebrovascular accident

In October 2008 (22 months prior to the commencement of the study), CL had a left hemisphere stroke which left him with very little spoken language and a right sided hemiparesis. He received several months of speech–language therapy input (in English) while in a rehabilitation unit and has continued to make progress with his language and communication. Prior to the stroke, CL was a keen singer and was saddened that as a direct consequence of the aphasia he was no longer able to enjoy singing. Recently, he has joined a community choir for people with neurological disorders (stroke, Parkinson's Disease) and he is reportedly able to fully participate in this.

2.3. Procedure

In their study of non-aphasic "normal" New Zealand English speakers, Paulin and Purdy (2008) revealed the relatively poorer performance of their participants compared to the "normal" group reported by Paradis (1987). They concluded that the BAT is a useful assessment for the New Zealand context, but requires some modifications. Therefore, the modified version was used in the current study. Firstly, it was administered in Mandarin by the second author over two sessions. This was followed by the administration in English by the first author over a further two sessions. All assessment sessions were conducted in CL's home with his wife in attendance. In addition, informal conversations about the impact of aphasia on their life as a couple occurred during each visit.

3. Results

Table 2 illustrates CL's results for each subtest and compares his performance with the 30 New Zealand English (NZE) speakers (Paulin & Purdy, 2008) and the "normative scores" of Paradis (1987). There are no published norms for the BAT in Mandarin. As outlined in Paulin and Purdy (2008; p.59), Paradis reports the normal data as number of errors rather than the number of items correct. The scores

Table 2

CL's subtest scores and normative data (Paulin & Purdy, 2008 p.58 and Paradis, 1987 p. 210).

Subtest	CL's score Mandarin	CL's score English	Paulin and Purdy (2008) Mean ^a	Paulin and Purdy (2008) Minimum Score ^b	Paradis (1987) 'Normal' Score ^c
<i>Auditory Comprehension</i>					
Pointing (single words)	10	10	10	10	10
Commands simple	7	7	9.7	9	9
Commands complex	18	7	19.3	17	8
Verbal auditory discrim.	13	10	17	15	15
<i>Auditory Syntactic Comp.</i>					
Standard	10	10	12.9	12	13
Pronominal reference	6	5	5.9	5	5
Self-reference	5	5	6.8	4	7
Passive	6	6	7.7	4	7
Topicalised subject	11	7	11.6	7	10
Standard negative	9	11	11.4	9	10
Passive negative	8	5	10.9	7	9
Reversible possessive	14	11	15.9	15	15
Semantic categories	5	4	4.9	4	4
Synonyms	5	1	4.5	2	4
Antonyms	8	7	9.1	6	8
Grammaticality judgment	9	6	9.7	9	9
<i>Semantic acceptability</i>					
Repetition single words	28	22	29.4	26	30
Judgment	27	21	29.7	27	29
Sentence repetition	5	1	6.9	6	6
Series	1	1	2.9	2	3
Verbal fluency 't/p'	7	7	16.8	5	N/A
Verbal fluency 'f'	10	9	15.6	4	N/A
Verbal fluency 'k'	6	4	14.9	3	N/A
Verbal naming	14	16	19.8	19	20
Sentence construction	29	27	30.6	29	Unavailable
Semantic opposites	9	8	9.6	8	9
Derivational morphology	6	8	8.5	1	8
Morphological opposites	9	7	8.9	5	8
Narrative description	5	5	5.9	5	N/A
<i>Arithmetic</i>					
Arithmetic	13	9	14.4	10	13
Listening comprehension	3	4	4.6	3	4
Reading single words	10	10	10	10	10
Reading sentences	6	8	9.9	9	9
Reading paragraph	6	4	5.9	4	5
Copying single words	5	5	5	5	5
Dictation single words	4	3	4.8	4	5
Dictation sentences	27	21	26.7	24	26
Reading comp words	10	9	10	10	9
Reading comp sentences	8	8	9.3	8	9

^a Mean score refers to data published by Paulin and Purdy (2008; 58). $N = 30$.^b Minimum score is the lowest score achieved by any participant (see Paulin & Purdy, 2008; 58).^c 'Normal' score refers to data published by Paradis (1987, p. 210).

reported in Table 2 have been converted into minimum scores from the original error scores in order to make a comparison.

As can be seen in Table 2, CL scored 100% correct in both Mandarin and NZE on four of the 40 subtests, pointing (single words), semantic acceptability, reading aloud single words and copying single words. For two of these subtests (pointing to single words and reading aloud single words) the 'normative sample' of NZE speakers also achieved full marks. CL scored 100% correct in a further four subtests in Mandarin only (semantic categories, synonyms, paragraph reading comprehension and reading comprehension words). Interestingly, there were no subtests where he scored 100% correct in English only.

His poorest performance was in comprehension of complex commands in English, synonyms in English, grammaticality judgment in English, sentence repetition in English, and arithmetic in English.

As per the scoring method for comprehension of complex commands, a point was given for each subcommand performed correctly. There were no instances where CL could not perform *any* of the subcommands, but there were two sentences where he achieved two subcommands correctly and three sentences where he achieved only one subcommand. With respect to the synonyms in English, CL had a tendency to select the last word in the list of four options, despite correctly selecting the synonym in the example item.

His scores in each of these poor performing subtests fell below the minimum scores for both sets of English normative data (Paulin & Purdy, 2008; and Paradis, 1987). This was an unexpected finding given his stated preference for English over Mandarin, but there were four subtests (comprehension of standard negative sentences, verbal naming, derivational morphology and reading aloud sentences) where he performed better in English than in Mandarin, though the differences were relatively minimal.

Fig. 1 below illustrates his percentage correct scores for the twelve auditory comprehension subtests, in both languages.

Verbal fluency scores were extremely similar in both languages. CL’s actual responses have been provided in Table 3. The target phonemes for Mandarin were /t/, /f/ and /k/ and for English they were /p/, /f/ and /k/. Verbal fluency (or “word fluency” or “word association” as it is sometimes called) is often used as an indicator of lexical retrieval in assessments of aphasia. While there are no known norms for this subtest, the Comprehensive Aphasia Test (Swinburn, Porter, & Howard, 2004; p.50) provides an indicator of performance for post-acute aphasia ($n = 195$). The mean score for words beginning with the phoneme /s/ was 9.37 words (SD = 9.11) with a very wide range of 0–42 words. CL’s raw scores of 7, 10, 6 (for /p/, /f/ and /k/ respectively in English) and 7, 9, 4 (for /t/, /f/ and /k/ respectively in Mandarin) are rather low. The other noteworthy feature of CL’s verbal fluency is the variety of word classes used in both the Mandarin and New Zealand English versions of the task. He retrieved nouns and verbs with relative ease in both languages along with adjectives in English and pronouns in Mandarin. This would suggest that despite a relatively low number of items for each phoneme, he was able to retrieve a good variety of word classes. Sarno, Postman, Cho, and Norman (2005) discussed this type of lexical diversity in terms of qualitative improvement in a person with aphasia even though their overall score may not change.

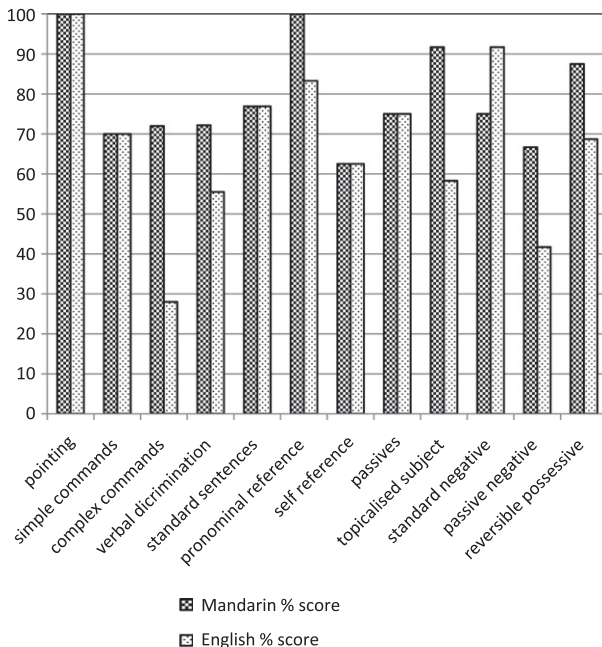


Fig. 1. Auditory comprehension subtests in both languages (% correct).

Table 3
Verbal fluency responses for Mandarin and English.

	Mandarin	English
Target phoneme/f/	佛 [Buddha]	female
	發 [to give out]	flower
	逢 [to sew]	friends
	罰 [to punish/sentence] 方 [square]	foreigner
	凡 [sail]	forward
	風 [wind]	fun
	縫 [a crack]	formal
	飛 [to fly]	five
	房 [house]	philosophy
	客 [guest]	kill
Target phoneme/k/	渴 [thirsty]	kia ora [greetings in Māori]
	殼 [shell]	kiss
	卡 [card]	car
	靠 [to lean]	
Target phoneme/t/	尻 [tailbone]	
	他 [he/him]	
	踏 [to step]	
	塔 [tower]	
	台 [stage]	
	頭 [head]	
	挑 [to choose]	
	桃 [peach]	
Target phoneme/p/		peace
		paper
		position
		policeman
		papa
		postcard
	page	

4. Discussion

CL's relatively similar performance in Mandarin and NZE in several of the subtests (e.g. verbal fluency, serial sequences and verbal naming) is suggestive of some degree of shared lexical processing or his relative proficiency in NZE. However, there were a number of subtests (e.g. synonyms, grammaticality judgment, repetition of sentences, derivational morphology, arithmetic and comprehension of written and spoken paragraphs) where his performance was noticeably poorer in one of the two languages, suggesting differential processing strategies. Interestingly, there was no evidence of any code-switching during the assessment sessions (or in the informal conversations). CL's roughly equivalent impairment across both languages is suggestive of the "Parallel recovery" pattern (Paradis, 2001).

As we know from the literature, equal knowledge of two languages in a bilingual speaker is rare. In reality, the bilingual individual generally develops varying degrees of competence in each language across different domains as opposed to possessing equal proficiency in all areas for both languages (Grosjean, 1989). For CL prior to the stroke his "stronger" language (Cantonese) was used in the home setting, but he discussed work-related activities, politics, and academic issues with greater facility and preference in Mandarin (prior to moving to New Zealand in 1998) and with significant skill in English (after moving to New Zealand in 1998). He reports that post-stroke he uses Cantonese, Mandarin and English at home. Thus, language preference for a particular topic may not necessarily be a function of overall language proficiency, and it is important to acknowledge that CL's degree of bilingualism often changes across time, topic, and context. While CL and his wife reported that he spoke and understood all three languages well pre-morbidly, he did appear to prefer to use English when discussing certain topics and when communicating with certain people such as the doctor and rehabilitation staff. He reportedly preferred to use Mandarin when discussing some topics, and Cantonese when interacting with some friends and his grandchildren.

CL and his wife informally described the linguistic and psychosocial consequences of living with Mandarin-New Zealand English bilingual aphasia. Despite his dedication to home practice, he reported

on-going difficulty with word retrieval in particular contexts. He finds that he looks to his wife for assistance with English word-finding in particular contexts (especially within the medical arena) and Mandarin word-finding in other contexts, which he would not have needed to do prior to the aphasia. He reported being frustrated by the slowness of his language processing when speaking in Cantonese to his grandchildren which causes him some embarrassment. They also described their difficulty accessing rehabilitation services in Mandarin. They were both satisfied with the English language services they received, but believed that CL would have made more significant improvement had he been given access to Mandarin-speaking rehabilitation specialists. It is now over two years since CL had the stroke, so access to publicly-funded therapy is limited. Should he be in a position to access more therapy, the decision will have to be made as to which language to target during treatment. Goals that are culturally appropriate and promote community re-entry with maximal quality of life will need to be developed. In general, the language of choice will be the one that CL is most likely to use in the home and community setting. CL uses different languages in different contexts and hence the language of choice for therapy should depend on therapy goals that he, his wife, and the therapist agree upon. The speech language therapy profession in New Zealand is becoming more culturally and linguistically diverse, but there are still few therapists able to work with adults with aphasia across a range of different languages such as Mandarin, English, and Cantonese. This is likely to compromise the therapy goals that can be addressed and is consistent with CL and his wife's report that he would have made more progress if treatment could have occurred in Mandarin as well as English.

CL's profile of scores shows good consistency in some areas with published normative data, providing preliminary evidence for the validity of existing BAT norms for the Mandarin–New Zealand English bilingual population. The comparison of Mandarin and English performance also shows differences in the profile of impairment across languages. Some of these differences can be explained in terms of the inherent differences between the languages. For example, the relatively higher score in the Mandarin auditory comprehension of complex commands, when we know that Mandarin is a language that has SVO and SOV features, whereas English does not. Additionally, CL reports a preference for using these languages in different contexts. In this case the profile of strengths and weaknesses provided by the BAT scores in the two languages can be coupled with CL's context-specific communication and participation goals to guide therapy. This case study illustrates the need to consider both the impairment and functional communication goals and how the combination of impairment and functional goals can differ across language and cultural contexts. For example, therapy that focuses on word retrieval will need to ensure that the stimulus is selected to meet his functional needs (including medical terms in English, political terms in Mandarin and familial terms suitable for conversing with young grandchildren in Cantonese).

5. Conclusion

The current case study of a 74 year old gentleman investigated the consequences of living with Mandarin–New Zealand English bilingual aphasia. The modified (for New Zealand English) version of the Bilingual Aphasia Test was used to examine the language skills of the participant. His profile of performance showed a relatively similar pattern of errors across the subtests suggesting a process of parallel recovery (Paradis, 2001).

It is highly probable, if not certain, that increasing numbers of bilingual individuals will require services throughout the 21st century. While we have made considerable progress in our understanding of the bilingual brain, much remains to be discovered regarding the most appropriate clinical assessment and intervention procedures to be implemented with this population. The current study suggests that we need to consider many factors when planning intervention for a person with bilingual aphasia and that we should anticipate the pattern of recovery resulting from a combination of the language proficiency as well as the age and context of acquisition, thus supporting the view of Paradis (1977).

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