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# VALENCY ADJUSTING STRATEGIES IN RAGA, A LANGUAGE OF VANUATU

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## Abstract

Languages have various ways of adjusting valency by either, increasing, decreasing or simply rearranging the syntactic valence of clauses. This paper focuses on the various valency adjusting strategies in Raga. Raga, genetically, is a member of the North–Central Vanuatu subgroup of the Oceanic languages in Vanuatu, a multilingual country with over a hundred indigenous languages. Raga is considered as one of the biggest languages of Vanuatu with around seven thousand speakers. Data for this study was collected during a fieldtrip and observations on the northern part of Pentecost where Raga is spoken as well as in Port Vila. The analysis shows that Raga follows a SVO constituent order and it is a nominative accusative language by distinguishing the subjects of both transitive and intransitive verbs from the object of the transitive verbs. Although much has been written on Raga, little has been written on its valency adjusting devices and therefore the purpose of this paper is to focus on the valency adjusting strategies. Analysis shows that Raga applies a range of structures as a means of adjusting the grammatical relations and semantic roles of verbs to their arguments. Like other Oceanic and Vanuatu languages, valency increasing and valency decreasing devices are common in Raga and both these valency adjusting devices mostly occur morphologically through the morphological fusion between the predicate of cause and that of effect. Causative as well as transitive clitics with an applicative role are two strategies, through which Raga verbs increase their valence. On the other hand, valency decreasing strategies in Raga comprise de-transitiviser,

anti-causative, and verb reduplication. These valency increasing and decreasing devices play a very important role in modifying the syntactic and semantic relationships that exist between the verbs and their arguments in Raga.

## 1. Introduction

Raga, genetically, is a member of the proto North–Central Vanuatu (NCV) subgroup of the Oceanic languages in Vanuatu, a multilingual country with over a hundred indigenous languages. Raga language has been widely documented by various writers for religious as well as for secular reasons such as its descriptive grammar (Patterson 1860, Codrington 1885, Walsh 1966, Walsh & Lini 1981 & Vari-Bogiri 2011), its phonology (Walsh 1962; 1982), its lexicon (Hardacre 1924, Yosioko & Leona 1992, Leona & Pond 2000) or its genetic classification (Codrington 1885, Grace, 1955, Tryon, 1976, Clark 1985, 2009, Lynch 1995). These studies, with other modern grammar of Vanuatu languages within the North–Central Vanuatu subgroup, a notional group to which Raga belongs (Walsh 1966, Crowley 1982, Early 1994, Jauncey 1997, Hyslop 2001, Francois 2002, Thieberger 2006 and Vari-Bogiri 2011), all contributed to giving insights into the analysis of this study. Raga is considered as one of the biggest languages of Vanuatu with around seven thousand speakers. Data for this study was collected during a fieldtrip and observations on the northern part of Pentecost where Raga is spoken as well as in Port Vila.

Despite the wide range of documentation in Raga thus far, it still lacks the full explanation and exemplification of the range of its valency adjusting devices. Therefore, this paper focuses on the range of valency adjusting devices and their syntactic and semantic roles within the Raga language of Vanuatu.

### 1.1 *Simple Declarative clause in Raga*

Raga, typologically, is a left-headed language not only because it is a SV(O) language and uses prepositions to express peripheral arguments, but because it has the head to the left of the modifier, in terms of nominal heads and modifiers as well as verbs and adverbial modifiers. Core and non-core/oblique elements of a clause are coded differently in Raga. Clauses with the verbal predicate at the core follow the SV/AVO order while the non-core/oblique elements of a clause are expressed through prepositions. Verbal predicate at



with an indirect transitive notion such as having an action being done to or at an object (8).

Like many Oceanic languages, Raga depicts a nominative-accusative pattern in its formal marking of the core syntactic roles. This means that it uses a similar coding system for subjects of both transitive and intransitive verbs while a different coding system is used for direct objects of transitive verbs. The distinction between the subjects and the objects is marked by word order. So, in both (4) and (5), the subjects of both intransitive and transitive verbs are pre-verbal while the object (5) is post-verbal. Moreover, the third person singular subject is coded the same way as *mwa* in both the subject of the intransitive verb *mana* (4) as well as the subject of its transitive form as laughing at someone (5) while the third person singular object is coded differently as *-a* (5).

- |    |  |                               |                                       |                                       |                              |                                       |
|----|--|-------------------------------|---------------------------------------|---------------------------------------|------------------------------|---------------------------------------|
| 4. | <i>Nitu-na</i><br>Child-3SG.POSS       | <b><i>mwa</i></b><br>3SG.CONT | <i>mana</i><br>laugh                  |                                       |                              |                                       |
|    | 'Her child is laughing.'               |                               |                                       |                                       |                              |                                       |
| 5. | <i>Nitu-na</i><br>Child-3SG.POSS       | <b><i>mwa</i></b><br>3SG.CONT | <i>manu-hi-a</i><br>Laugh-APP-3SG.O   |                                       |                              |                                       |
|    | 'Her child is laughing.at him/her/it.' |                               |                                       |                                       |                              |                                       |
| 6. | [ <i>Mua</i><br>mother                 | <b><i>mwa</i></b><br>3SG.CONT | <i>batu-a.</i><br>weave-3SG.O         |                                       |                              |                                       |
|    | 'Mother is weaving it.'                |                               |                                       |                                       |                              |                                       |
| 7. | [ <i>Tua-ra</i><br>friend-3PL.POSS     | <b><i>nu</i></b><br>3SG.PERF  | <i>surai-ni-ra.</i><br>steal-TR-3PL.O |                                       |                              |                                       |
|    | 'Their friend stole them.'             |                               |                                       |                                       |                              |                                       |
| 8. | [ <i>Vwiriu</i><br>dog                 | <i>bila-n</i><br>CL-CST       | <i>bena</i><br>uncle                  | <i>Nono</i><br>Nono                   | <b><i>nu</i></b><br>3SG.PERF | <i>batoi-ni-ra.</i><br>bark-APP-3PL.O |
|    | 'Uncle Nono's dog barked at them.'     |                               |                                       |                                       |                              |                                       |
| 9. | [ <i>Ira</i><br>PL                     | <i>vavine</i><br>female       | <b><i>ra-n</i></b><br>3PL-PERF        | <i>manu-hi-au.</i><br>laugh-APP-1SG.O |                              |                                       |
|    | 'The females/women laughed at me.'     |                               |                                       |                                       |                              |                                       |



- [ CORE ] + [NON-CORE/OBLIQUE]
15. [*Ra-v gel malogu garigi.*]  
 3PL-FUT dig kava today  
 ‘They will dig the kava today.’

**Table 1: Tripartite divisions of clausal layers and possible components**

CLAUSAL LAYERS	SUBJECT	SUBJECT MARKER AND TAM	VERB	MODIFIER	TRANSITIVISER OR APPLICATIVE	OBJECT	PREPOSITIONAL PHRASE (PP) & ADVERB OF TIME
Nucleus		✓	✓	✓			
Core	✓	✓	✓	✓	✓	✓	
Periphery							✓

### 1.2 Valency Devices

There are a range of valency adjusting devices and their syntactic and semantic roles in Raga. The distinction between the semantic and syntactic valence is clearly defined by Payne (1997:170–171). Semantic valence refers to the number of participants that must be “on stage” by the verb. For example, the verb ‘drink’ could have a semantic valence of two in its transitive form where there is the drinker or the person who does the drinking as well as the fluid that is being drunk. Grammatical or syntactic valence refers to the number of arguments in any given clause. So, for example, the syntactic valence of the verb drink could be the nominal elements of the agent and the object. Valency adjusting strategies in this case would mean the morpho-syntactic re-arrangements that adjust the syntactic valence of a clause. Payne (1997:172) notes that languages have various ways of adjusting valency such as increasing, decreasing, or rearranging the syntactic valence of clauses. While on the one hand, increasing the valence entails the upgrading of a peripheral participant to centre stage, on the other hand, decreasing the valence involves either the movement of a centred participant to the periphery or its total elimination from the scene. The valence of the verb changes according to the number and role of the arguments or participants.



## 2. A-type and O/U-type verbs

A-type and O/U-type verbs have distinct roles in the valency rearrangement strategy. The distinction between the A-type and O-type/U-type verbs was referred to by Dixon, 1988, Hyslop, 2001, and Ross, 2004, in their roles in the valency rearrangement process. Ross (2004) noted that typical Oceanic languages have a myriad of valency-changing morphemes which interact with A-type and U-type verbs in various ways to shift semantic roles from subject to object or vice versa and these shifts are mainly lexical derivational. They are regarded as two verb classes due to the semantic roles of their subject and object arguments in their intransitive and transitive forms. Ross (2004:504) refers to the A-verbs as the Actor verbs because the Actor is subject of both the intransitive (16) and its transitive form (17). So, in (16) and (17), the verb *vas-vasogo* ‘reading’ is an example of an A-verb because in both its intransitive and transitive form, the semantic function of the subject, *nitu-na* ‘her child’ remains the actor. Further reference to the employment of A-verbs in their roles as valency decreasing device is discussed in 4.3. Ross (ibid) further refers to the U-verbs as the undergoer verbs because the subject of the verb is the undergoer, not the actor. Although the subject shifts from the object slot to the subject slot during valency change, semantically, the object still retains its semantic function as an undergoer. In Raga, examples of these U-verbs are mostly causative verbs which, in their de-transitivised forms, occur with the anti-causative prefix *ma-* as illustrated in (19). The verb *bora ~vora* ‘break’ is an example of a U-verb because in its intransitive form (19) although syntactically, *pletei vwate* ‘a plate’ has shifted from the object slot (18) to the subject slot (19), semantically, it still retains its function as an undergoer and not actor. The use of U-verbs are further discussed in 4.1. In their transitive form, the agent is the causer and the object is the patient or the undergoer which has undergone some kind of change as a result of the action of the causer.

- |                         |            |                   |
|-------------------------|------------|-------------------|
| 16. <i>Nitu-na</i>      | <i>mwa</i> | <i>vas-vasogo</i> |
| Child-3SG.POSS          | 3SG.CONT   | REDUP-read        |
| ‘Her child is reading.’ |            |                   |

17. *Nitu-na*                      *mwa*                      *vasogo*                      *avo-an*                      *sabuga.*  
 Child-3SG.POSS                      3SG.CONT                      read                      talk-NOM                      sacred  
 ‘Her child is reading the Bible.’
18. *Virana*                      *nu*                      *lol*                      *bora*                      *peleti*                      *vwate.*  
 Virana                      3SG.PERF                      make                      break                      plate                      ART  
 ‘Virana broke a plate.’
19. *Peleti*                      *vwate*                      *nu*                      *ma-vora.*  
 plate                      ART                      3SG.PERF                      ANTICAUS-break  
 ‘A plate had broken.’

### 3. Valency increasing devices

The valence of verbs increases through several strategies, modifying the syntactic and semantic relationship that exists between the verbs and their arguments. The distinction between the semantic and syntactic valence is clearly defined by Payne (1997:170–171). Semantic valence refers to the number of participants by the verb. For example, the verb ‘drink’ could have a semantic valence of two in its transitive form where there is the drinker or the person who does the drinking as well as the fluid that is being drunk. Grammatical or syntactic valence refers to the number of arguments in any given clause. So, for example, the syntactic valence of the verb drink could be the nominal elements of the agent and the object. Valency adjusting strategies in this case would mean the morpho-syntactic re-arrangements that adjust the syntactic valence of a clause. Payne (1997:172) notes that languages have various ways of adjusting valency such as increasing, decreasing, or rearranging the syntactic valence of clauses. While on the one hand, increasing the valence entails the upgrading of a peripheral participant to centre stage, on the other hand, decreasing the valence involves either the movement of a centred participant to the periphery or its total elimination from the scene. The valence of the verb changes according to the number and role of the arguments or participants. In Raga, these strategies occur either morphologically or at the syntactic level and are categorised as causative (3.1) and as transitive clitics with an applicative role (3.2).

### 3.1 Causatives

One of the valence increasing strategies which can derive a transitive verb from an intransitive verb or a bi-transitive verb from a transitive one is through causatives. Payne (1997:176) states that causative predicates always involve one more argument than the caused predicate. Causatives increase the valency by introducing a new participant or actor into the argument

In a typical causative construction, Jae Jung Song (2001) states that the causer's action is expressed by the predicate of cause while the causee's action by the predicate of effect. In the causative construction, the cause NP, who is the new participant, is now the grammatical subject of the whole causative sentence and the predicate of cause the main verb of the sentence. While the causer NP and the predicate of cause have been elevated to the foreground, on the other hand, the causee NP and the predicate of effect are 'backgrounded' as they do not occupy a prominent position in the sentence as do the causer. According to Elson and Pickett (1983:103), Comrie (1985:331) and Payne (1997:176), causatives can occur at three different levels categorised as lexical, morphological and syntactic. While at the lexical level the causing and the caused events are encoded in a single lexical item, in the morphological causatives, the two events are encoded in a single verb complex with a causative morpheme.

While Payne indicates the third category as periphrastic, Comrie and Elson and Pickett refer to it as syntactic through which a causative situation can be expressed using a verb 'to cause' or 'to make'. When making reference to the typology of causative constructions, Jae Jung Song (2001:260) identified three ideal parameters for morphological fusion between the predicate of cause and that of effect and these include the isolating or analytical, agglutinating and finally fusional or inflectional. From these parameters of fusion, comes the morphological, lexical, and syntactic causative types. Causative is an active valency increasing strategy in Raga, and since Raga is an Oceanic language, and like most Oceanic languages, morphological causatives plays a much more important role in which the predicate of cause is in the form of a derivational morpheme or an affix (either prefix or suffix) such as *ba- ~ va*<sup>-1</sup> (3.1.1), while *lol* is a causative at the syntactic level (3.1.2).

#### 3.1.1 *ba- ~ va-* causative at the morphological level

The pre-verbal inflectional prefix *ba- ~ va-* is a morphological causative that changes the behaviour of the verb while at the same time modifying the

semantic orientation of the verb to its arguments. Semantically, the pre-verbal prefix *ba-* ~ *va-*, according to Lynch et al. 2002:83, is a reflex of POc *\*pa-/\*paka-* ‘causative’. According to Lynch (1995:144) POc *\*paka-* expresses the notion that the subject makes or causes the action of the verb to happen. In so doing, it has a causative effect on the verb and thus increases its valence with an introduced agent which is coded as the grammatical subject of the whole causative sentence. According to Comrie (1981:167–168), the morphological causative normally has a valency one higher than that of the corresponding non-causative, since in addition to the argument of that non-causative predicate, there is also the causer. Examples in Raga show that with the morphological causative *ba-* ~ *va-*, valency increases both from intransitive with one argument to transitive with two arguments (20)–(21) and also from a transitive with two arguments (22) to di-transitive with three arguments (23). Firstly, the stative verb *rahu* ‘to be alive’ (20) increases its valency through the morphological causative *ba-* ~ *va-* through which the number of arguments increase from one to two (21). Although with this stative verb, the actor *nituna* ‘his/her child’ in (20) has shifted from the subject slot to the object slot (21), in both cases (20 & 21), it maintains the semantic function of an undergoer and is an example of an O-type verb. In the next example, the transitive verb *gan* ‘eat’ increases its valency, through the morphological causative *ba-* ~ *va-*, by increasing its arguments from two (22) to three (23). For example, *nituna* ‘his/her child’ who was an actor and whose action was voluntarily in (22) is now demoted to an experiencer or undergoer in (23) experiencing the action of an introduced participant *ratahi-na* ‘his/her mother’. In this example, the action of eating is no longer voluntary but is being caused to happen by another participant. While in (22) the verb *gan* ‘to eat’ has only two arguments — actor and the object, in (23), with the causative prefix *ba-* ~ *va-*, the number of arguments has increased to three, comprising the agent, the patient and the indirect object. In (22), *damu* ‘yam’ is part of the core argument, while in (23), it has been demoted to a non-core or an optional argument.

- |  |                        |                      |
|--|------------------------|----------------------|
| 20. <i>Nitu-na</i><br>child-3SG.POSS<br>‘His/her child is alive’ | <i>mwa</i><br>3SG-CONT | <i>rahu.</i><br>life |
|--|------------------------|----------------------|

21. *Ra-n*            ***va-rahu***            *nitu-na*.  
 3SG-PERF          CAUSE-live          child-3SG.POSS  
 ‘They saved his child.’
22. *Nitu-na*            *mwa*            *gan*            *damu*.  
 child-3SG.POSS      3SG.CONT          eat            yam  
 ‘His/her child is eating yam.’
23. *Mwa*            ***ba-gan***            *nitu-na*            *gin*            *damu*.  
 3SG.CONT          CAUSE-eat          child-3SG.POSS      INST          yam  
 ‘S/he is feeding his/her child with yam.’

### 3.1.2 *lol* causative at the syntactic level

A way in which Raga marks causative at the syntactic level is with the verb *lol* ‘to make’ where another noun normally occurs between *lol* as the cause predicate and the other verb as the effect predicate. When the verb *lol* is introduced into a clause with an intransitive predicate, it modifies the semantic orientation of the intransitive predicate to a transitive predicate by introducing an agent. With the introduction of the causative *lol* ‘to make’ or ‘to cause to happen’, the following intransitive verbs *dei* ‘cry’(24), *maturu* ‘sleep’(25), *hovi* ‘fall’ (26) and the stative verb *haro* ‘to be sick’(27) derive their transitive form by increasing the number of arguments from one to two. In (24) – (26), the noun, with the grammatical role of patient or undergoer, that occurs between the verb *lol* and the cause predicate takes the form of a full NP. However, in (27), the patient or the undergoer takes the form of third person singular pronominal object *-a*, indicating that the context or the pronominal object is known to both the addressor and the addressee or the speaker and the listener.

24. *Ra-n*            ***lol***            *tua-ra*            *mwa*            *dei*.  
 3SG-PERF          make            friend-3PL.POSS      3SG.CONT          cry  
 ‘They made their friend cry.’
25. *Vi*            ***lol***            *nitu-na*            *vi*            *maturu*.  
 3SG.FUT          make            child-3SG.POSS      3SG.FUT          sleep  
 ‘She will put her child to sleep.’

26. *Tua-ra*            *mwa*            *lol*            *ga-n*            *damu*    *mwa*            *hovi*.  
 friend-3PL.POSS    3SG.CONT    make    CL-3SG.POSS    yam    3SG.CONT    fall  
 ‘Their friend dropped his/her yam (that s/he was going to eat).’
27. *Ige*    *mwa*            *loli-a*            *mwa*            *haro*.  
 fish    3SG.CONT    make-3SG.O    3SG.CONT    sick  
 ‘The fish caused him/her to be sick.’

### 3.2 Transitive clitics with an applicative role

The transitive clitics in Raga that function as applicative modify the semantic orientation of an intransitive predicate to a transitive predicate, consequently increasing its argument or valency by introducing an applied object. While transitive marking on a transitive verb is used to indicate that it has an object with the semantic function of an undergoer, transitive marking with a semantic role of an applicative allows intransitive verbs to increase their arguments by introducing peripheral object or an applied object with actions being done on, at or for a reason. These transitive clitics with an applicative function can only introduce objects as an applied object as well as a peripheral argument, expressed as an oblique. Payne (1997:186) describes applicative as a valence increasing operation that brings a peripheral participant onto centre stage by making it into a direct object. Lynch (1998:140) refers to applicative as another transitive suffix which is a reflex of POC\**-aki* /*\*-akini* and whose function is to refer to the instrument with which an action is carried out, the reason for performing an action or for some other indirect transitive notion. The Raga transitive clitics *-ni-* (3.2.1), *-hi-* (3.2.2), and *-vi-~-v-* (3.2.3) would be considered as the Proto Oceanic ‘long’ transitive suffix reflecting the POC\**-akini* which according to (Pawley 1973; Evans 2001; Pawley 2001:197) derives transitive verbs from intransitive verbs with direct objects standing in such semantic relations as instrument, concomitant and cause.

#### 3.2.1 *-ni-*

In Raga, the transitive clitic *-ni-* functions both as a transitiviser as well as an applicative. The clitic *-ni-* only applies if the object, as the undergoer, is a pronominal object as illustrated in (28)–(29). However, if the object, whose grammatical role is an undergoer, is in the form of a full NP, then the *-ni-* does not apply, as illustrated in (30)–(31). Therefore, the use of the transitive clitic *-ni* is grammatically correct in (31) while it is ungrammatical in (\*32), because it cannot accept an object in the form of a full NP. This transitive clitic

*-ni* can also function as an applicative because it derives a transitive verb from an intransitive verb (see Table 2) by introducing an argument in the object slot with various semantic functions of a goal, content, cause, or a benefactor.

It is difficult to clearly distinguish the semantic role labels of the added arguments (Table 2) like the verbs to talk about something, to bark at something, to gossip about something, to be angry at someone or to be afraid of something. The thing that is talked about, or barked at, gossiped about, or afraid of could possibly be considered as a content, a goal, a cause or a benefactive, which is what is used in this case (Table 2). The following intransitive verbs *matagu* ‘afraid’ (30), *bato* ‘bark’ (31), *uloi* ‘shout’ and (32) derive their transitive form through the transitive clitic *-ni-* with an applicative role.

28. *Ira natu-ri-rigi ra-m matagu-ni-a.*  
 PL child-REDUP-small 3PL-CONT afraid-APP -3SG.O  
 ‘The children are afraid of it/him/her.’
29. *Vwiriu mwa batoi-ni-ra i*  
 Dog 3SG.CONT bark- APP-3PL.O and  
*vuvuri tama-ra mwa batoi-ni-ra.*  
 SEQ father-3PL.POSS 3SG.CONT growl-APP-3PL.O  
 ‘The dog barked at them and then their father growled at them.’
30. *Tama-ra mwa lolhoro ratahi-ra.*  
 father-3PL.POSS 3SG.CONT angry mother- Poss-3PL.POSS  
 ‘Their father is angry with their mother.’
31. *Tuana-ra mwa matagu bila-ra vwiriu*  
 FRIEND-3PL.POSS 3SG.CONT afraid Poss-3PL.POSS dog  
 ‘Their friend is afraid of their dog.’
- \*32. *Tuana-ra mwa matagu-ni bila-ra vwiriu*  
 FRIEND-3PL.POSS 3SG.CONT afraid-APP Poss-3PL.POSS dog  
 ‘Their friend is afraid of their dog.’

**Table 2: Clitic *-ni-* with various semantic functions**

VERB	GLOSS	TRANSITIVISED FORM	GLOSS	SEMANTIC FUNCTION OF THE ADDED ARGUMENT
<i>avo</i>	'speak/talk'	<i>avoi-ni-a</i>	'talk about him/her/it'	content
<i>bato</i>	'bark'	<i>batoi-ni-a</i>	'bark at him/her/it'	goal
<i>huña</i>	'gossip'	<i>huñai-ni-a</i>	'gossip about him/her/it'	cause
<i>lolhoro</i>	'angry'	<i>lolhoroi-ni-a</i>	'angry with him/her/ it'	benefactive
<i>matagu</i>	'afraid'	<i>matagu-ni-a</i>	'afraid of him/her/it'	cause

### 3.2.2 *-hi-*

The clitic *-hi-* is similar to the transitive clitic *-ni-* in its role of inflecting a transitive verb from an intransitive one. It is also similar in its role as a valency increasing device, through which the number of arguments increase from a monovalent to a bivalent comprising the agent and the object with a semantic function of either a goal, a source or benefactive.

The applicative clitic *-hi-* modifies the semantic orientation of an intransitive verb to transitive by introducing an object, thus increasing its valence. This applicative clitic reflects the Proto Oceanic applicative *\*-aki(ni)* which according to Lynch et al. (2002:44) the object of which could be an argument within the oblique such as a location, a goal, an instrument or a cause. The verbs listed from (32)–(33) and in (Table 3) show that the actions are being done to, at or on the patient as well as for a reason, illustrating various semantic functions. The intransitive verb *tañi* 'cry for' or 'to weep for' increases its valence with the applicative clitic *-hi-* (32), introducing an argument with a semantic role of a goal within the oblique. While *tañi* uses the applicative *-hi-* to increase its valence, the intransitive verb *dei* 'cry' increases its valency with *huri* 'for'. The intransitive verb *mana* 'laugh' increases its valence with the applicative clitic *-hi-* (33), allowing the addition of an argument in the object slot with a benefactive role. Both the intransitive verbs *mere* 'to urinate' and *datavis* 'to defecate' (34) also derive their transitive form through the applicative clitic *-hi-* which allows another argument with a semantic role of goal.



32. *Ra-n tañi-hi hano.*  
 3PL-PERF weep-APP what  
 ‘What are they crying for?’
33. *Garivi mwa manu-hi bwat-mahu-n guita.*  
 rat 3SG.CONT laugh-APP head-bald-CST octopus  
 ‘The rat laughed at the octopus’ bald head.’
34. *Nitu-ra mwa me-mere-hi-a*  
 child-3PL.POSS 3SG.CONT REDUP-urine-APP-3SG.O  
*i mwa da-davis-hi-a.*  
 and 3SG.CONT REDUP-defecate-APP-3SG.O  
 ‘Their child urinated on and defecated on itself.’

**Table 3: Clitic *-hi-* with various semantic functions**

INTRANSITIVE	GLOSS	TRANSITIVISED	GLOSS	SEMANTIC FUNCTION OF THE ADDED ARGUMENT
<i>mana</i>	‘to wash’ a person	<i>manu-hi-</i>	‘to laugh at’	source
<i>gagaru</i>	‘to have one’s wash or ‘to swim’	<i>garu-hi-</i> (a person)	‘to wash’	benefactive
<i>mere</i>	‘to urinate’	<i>mere-hi-</i>	‘to urinate on’	goal
<i>tañi/dei</i>	‘to cry’	<i>tañi-hi</i>	‘to cry for’/ weep; mourn for	source
<i>dadavis</i>	‘to defecate’	<i>dadavis-hi</i>	‘to defecate on’	goal

### 3.2.3 *-vi--v-*

The intransitive verb *lodo* ‘spit’ increases its valence with the applicative clitic *-vi--v-* which implies an added argument in the object slot with a semantic function of a goal, showing that the action is being done on an object. If the added argument is a noun, then the clitic *-v-* is employed (35), while a pronominal object accepts the clitic *-vi-* (36). However, it is important to note that this strategy is infrequent compared to the others.

35. *Mwa*            *lodo-v*            *bwalage-na.*  
3SG.CONT        spit-APP        leg-3SG.POSS  
‘S/he spits on his/her leg.’

36. *Mwa*            *lodo-vi-ra.*  
3SG.CONT        spit-APP-3PL.O  
‘S/he spits on them.’

#### 4. Valency decreasing devices

The valence of verbs in Raga decreases through several strategies, modifying the syntactic and semantic relationship that exists between the verbs towards their arguments. These strategies either occur morphologically or at the syntactic level.

- 4.1 *ma-* de-transitiviser and anti-causative
- 4.2 *bi-*+ verb reduplication reciprocal
- 4.3 verb reduplication de-transitiviser

##### 4.1 *ma-* detransitiviser and anti-causative

The Raga detransitiviser *ma-* reflects the Proto-Oceanic prefix \**ma-* which is also reflected in other modern Oceanic languages as a common (semi) productive valency-decreasing prefix (Evans & Ross, 2001:270). The role of *ma-* as a valency-decreasing prefix is found in some North New Guinea languages (eg. Bariai, Manam and Kairiru) as well as in the Arosi language of Southeast Solomonian and the New Caledonian language Xârâcùù. (Evans & Ross, (2001:271). The Formosan language of Kavalan also depicts this preverbal particle *ma-* as common in anti-causatives (Huang & Sung (2008:167). The detransitivising effect on verbs of the derivational prefix *ma-* has also been identified in other modern grammars of Vanuatu languages such as Paamese (Crowley 1982), Lewo (Early 1994), Tamambo (Jauncey 1997), the Lolovoli dialect of Northeast Ambae (Hyslop 2001), and Araki (François 2002) and Raga Vari-Bogiri, 2011). In Raga, the prefix *ma-* preposed to verbs has an anti-causative effect by eliminating the agent (A) and promoting the object of a transitive predicate (O) to the subject of the intransitive clause (S)

slot. The transitive verbs that undergo this morphological process to derive their intransitive form are categorised as O-type verbs (Dixon, 1988, Hyslop, 2001) or U-verbs (Ross, 2004) because although the object of the transitive predicate has now moved to the subject/agent slot in its intransitive form, it still maintains the semantic function of an undergoer or the case-role of patient

The introduction of *ma-* as a detransitiviser, decreases the valency of the predicate. The examples show the following seven verbs *salili* ‘pour’/ ‘spill’ (37)–(38), *bora ~ vora* ‘break’ or ‘shatter’ (39)–(40), *hera* ‘tear’ (41)–(42), *salañai* ‘pull down’ (43)–(44) and *sesera* ‘disclose’, ‘expose’ (45)–(46) and *havañi* ‘open’ (47)–(48) and *dadañi* ‘pour/spill’ (49)–(50) with the similar meaning as *salili*, to be among some of the verbs that use the prefix *ma-* as a detransitiviser, decreasing the valency of the predicate from two arguments to one.

In their transitivity form, the agent is the causer and the object is the patient or the undergoer which has undergone some kind of change as a result of the action of the causer.

Ross (2004) quotes Dixon (1988:205) that in Bouma Fijian, U-verbs are mostly verbs of affect like ‘crush’, ‘bend’, ‘fold’, ‘squeeze’, ‘tie up’. However, in their de-transitivised forms, these verbs in Raga occurring with the anti-causative prefix *ma-* refer to process with similar semantic functions as the ones identified in Samoan and Tamambo. In Samoa, according to Mosel and Hovdhaugen (1992:737–738) and Evans & Ross (2001) the occurrence of *ma-* with verbs indicate a semantic function of ‘destructions’, while in Tamambo these verbs denote processes whereby the object loses its physical unity (Jauncey 1997:135; Evans & Ross 2001:271). Likewise, in Raga, most of these verbs identified with the prefix *ma-*, show that the objects or patients in their intransitive forms have undergone some physical changes.

37.	<i>Nu</i>	<i>salil</i>	<i>ma-n</i>	<i>ti.</i>
	3SG.PERF	spill	CL-3SG.POSS	tea
	‘S/he spilt his/her tea.’			

38.	<i>Ma-n</i>	<i>ti</i>	<i>nu</i>	<i>ma-salili.</i>
	CL-3SG.POSS	tea	3SG.PERF	ANTICAUS-spill
	‘His/her tea spilled.’			

39. *Virana nu lol bora peleti vwate.*  
 Virana 3SG.PERF make break plate ART  
 ‘Virana broke a plate.’
40. *Peleti vwate nu ma-vora.*  
 plate ART 3SG.PERF ANTICAUS-break  
 ‘A plate broke.’
41. *Nu hera gaisaga-na.*  
 3SG.PERF tear dress-3SG.POSS  
 ‘She tore her dress.’
42. *Gaisaga-na nu ma-hera.*  
 dress-3SG.POSS 3SG.PERF ANTICAUS-tear  
 ‘Her dress is torn.’
43. *Ra-n salañai imwa-ra.*  
 3PL-PERF pull down house-3PL.POSS  
 ‘They pulled down their house.’
44. *Imwa-ra nu ma-salañai.*  
 house-3PL.POSS 3SG.PERF ANTICAUS-fall apart  
 ‘Their house fell apart.’
45. *Ra-m se-sera no-n daldale-ana.*  
 3PL-CONT REDUP-expose CL-3SG.POSS crazy-NOM  
 ‘They exposed his/her stupidity.’
46. *No-n daldale-ana mwa ma-sera-sera.*  
 CL-3SG.POSS crazy-NOM 3SG.CONT ANTICAUS-REDUP-expose  
 ‘His/her stupidity was exposed.’
47. *Ra-n havañ gatava.*  
 3PL-PERF open door  
 ‘They opened the door.’

48. *Gatava-n*            *situa*            *mwa*            ***ma-havañi***.  
 door-CST            store            3SG.CONT            ANTICAUS-open  
 ‘The door of the shop is opened.’
49. *Go-v*            *dadañ*            *wai*            *la*            *pankeni*.  
 2SG-FUT            pour            water            LOC            cup  
 ‘You will pour water in the cup.’
50. *Wai*            *mwa*            ***ma-dadañi***            *la*            *bata*.  
 water            3SG.CONT            ANTICAUS-spill            LOC            bed  
 ‘The water is spilt on the bed.’

Verbs that prototypically end with a vowel can sometimes have these vowels deleted before a noun. In the following examples, the verbs *salili* ‘spill’ (37)–(38), *havañi* ‘to open’ (47)–(48), *dadañi* ‘to pour’ (49)–(50) drop the last vowel when followed by a noun.

#### 4.2 *bi-* + verb reduplication **reciprocals**

Another valence decreasing strategy which changes the behaviour of the verb as well as its semantic relationship with the arguments is through the pre-verbal prefix *bi-* ~ *vi-*. With the addition of the prefix *bi-*, the verb automatically reduplicates whether partially or completely, causing the action of the arguments to be understood as reciprocal. The transitive verb *habwe* ‘find’ takes two arguments in the nucleus (51) while the valence decreases through the morphological process which comprises the prefix *bi-* with the verb reduplication (52). The same strategy is used in (53)–(54) with the verb *liñi* ‘to leave’.

51. *Tagaro*            *nu*            *habwe*            *tasala-na*            *la*            *hala*.  
 Tagaro            3SG.PERF            find            wife-3SG.POSS            LOC            road  
 ‘Tagaro met his wife on the way.’
52. *Ra-n*            ***bi-habwe-habwe***            *la*            *hala*.  
 3PL-PERF            RECIP-REDUP-find            LOC            road  
 ‘They met each other on the way.’

53. *Nu liñ tua-na la sara-n waḡa-gaga.*  
 3SG- PERF leave friend-3SG.POSS LOC field-CST vessel-fly  
 ‘S/he left his/her friend at the airport.’

54. *Ra-n bi-liñ-liñ la sara-n waḡa-gaga.*  
 3PL- PERF RECIP-REDUP-leave LOC field-CST vessel-fly  
 ‘They left each other/took leave of each other at the airport.’

#### 4.3 Verb reduplication de-transitiviser

Some transitive verbs undergo partial or complete reduplication with a range of meanings as well as function as a de-transitivising or valence decreasing strategy. The undergoer is eliminated through this reduplication process, modifying the semantic orientation of a bivalent predicate to a monovalent predicate. The verbs *ligo* ‘sew’ (55)–(56), *bwaga* ‘wash (clothes or dishes)’ (57)–(58), *basogo* ~ *vasogo* ‘read’ (59)–(60), and *garu* (61)–(62) are some transitive verbs which derive their intransitive form through reduplication process. While the verbs *ligo* and *baga*, derive their intransitive forms through full reduplication, the verbs *basogo* ~ *vasogo* (60) and *garu* (62) do so with partial reduplication of the first syllables. These transitive verbs are categorised as A-type verbs because although they derive their intransitive form through partial and complete reduplication, the semantic function of the subject in both forms still remains as actor.

However, intransitive verbs also reduplicate but with a semantic function of frequency. For example, *avo* ‘talk’ and *dei* ‘cry’ when reduplicated as *avo-avo* and *dei-dei* mean ‘chatterbox’ or ‘someone who always talks’ and ‘always cries’ respectively.

55. *Vi ligo gai-saga-na vaigougo.*  
 3SG.FUT sew stick-wear-3SG.POSS tomorrow  
 ‘She will sew her dress tomorrow.’

56. *Vi ligo-ligo vaigougo.*  
 3SG.FUT REDUP-sew tomorrow  
 ‘She will be sewing tomorrow.’

57. *Ra-n bwaga ira gai-saga bi-bili.*  
 3PL-PERF wash PL stick-wear REDUP-mud  
 ‘They washed the dirty clothes.’

58. *Ra-n*                ***bwaga-bwaga***        *huba*.  
 3PL-PERF                REDUP-wash                already  
 ‘They have already done the laundry.’
59. *Na-m*                *vasogo*                *avo-an*                *sabuga*.  
 1SG-CONT                read                talk-NOM                sacred  
 ‘I am reading the Bible.’
60. *Na-m*                ***vas-vasogo***.  
 1SG-CONT                REDUP-read  
 ‘I am reading.’
61. *Tua-na*                *mwa*                *garu-hi*                *nituna*.  
 friend-3SG.POSS                3SG.CONT                wash-APP                child-3SG  
 ‘His/her friend washed his/her child.’
62. *Tua-na*                *mwa*                ***ga-garu***  
 friend-3SG.POSS                3SG.CONT                REDUP-wash  
 ‘His/her friend is having his/her wash.’

## 5. Summary of valency adjusting devices

The different valence increasing and decreasing devices illustrate Raga as an Oceanic language, which mostly applies morphological causatives or derivational morphemes in modifying the semantic relationships of verbs towards their arguments, as summarised in Table 3.

**Table 3: Summary of the valency adjusting devices and their semantic orientation to arguments**

PROCESS	MARKING	FUNCTION	VALENCY (+) OR (-)
causative (morphological)	<i>ba-</i> ~ <i>va-</i>	introduces an argument (agent)	+
causative (syntactic)	<i>lol</i>	introduces an argument (agent)	+
Transitivity with an applicative nuance (morphological)	<i>-ni-</i>	introduces an argument (patient)	+
Transitivity with an applicative role (morphological)	<i>-hi-</i>	introduces an argument (patient)	+
Transitivity with an applicative role (morphological)	<i>-v-</i> ~ <i>-vi-</i>	introduces an argument (patient)	+
anti-causative (morphological)	<i>ma-</i>	de-transitivisation, which eliminates actor and promotes patient to agent	-
reduplication (morphological)	<i>bi-</i> + redup.	participants reciprocate action on or to each other, eliminates patient	-
reduplication (morphological)	verb reduplication (partial/complete)	de-transitivisation which eliminates undergoer/patient	-



**List of abbreviations and notational conventions**

The following abbreviations are used in glossing Raga morphemes

1, 2, 3	first, second, third person	O	object
A	agent	PERF	perfective tense marker
ANTI-CAUS	anti-causative	POSS	possessive
APP	applicative	PREP	preposition
ART	article	RECIP	reciprocal
AVO	Agent Verb Object	REDUP	reduplication
CONT	continuous tense marker	SG	singular
CL	clause	SV(O)	subject verb (object)
CST	construct suffix	TAM	tense/aspect/mood particle
FUT	future tense marker	TR	transitive marker
INST	instrument	VP	verb phrase
LOC	locative	*	Ungrammatical
NCV	North-Central Vanuatu		
NP	noun phrase		

**Notes**

- 1 In Raga, *ba-* and *va-* are two allomorphs of the same morpheme occurring in complementary distribution under different conditions

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# TAMARIKI AND FANAU: CHILD SPEAKERS OF MĀORI AND SAMOAN IN AOTEAROA/NEW ZEALAND

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## Abstract

After English, the two languages most spoken by children in Aotearoa/New Zealand are Māori, the indigenous language of the country, and Samoan, the language of one of New Zealand's first migrant groups. The ongoing vitality of both these Polynesian languages relies on them being transmitted to new generations of children. This study uses specially commissioned datasets from the 2013 Census to explore the rates of intergenerational transmission of these two languages, and sheds light on how the different circumstances relating to Māori and Samoan affect their rates of intergenerational transmission. The statistics presented also generate a number of potential questions for future investigation.

## 1. Overview

Since 1996, quinquennial Censuses have included a language question designed to elicit information about how many and which languages are spoken by people who live in New Zealand. English is the main language with 96% of the population reported as being able to speak it. At present, the two languages other than English with the highest number of speakers

are Māori and Samoan, these two languages being the most widely spoken in the Polynesian branch of the Austronesian language family. Māori is New Zealand's sole indigenous language, the language of the first inhabitants of Aotearoa/New Zealand. Te Reo Māori is also an endangered language and has been the subject of concerted national and tribal revitalisation efforts over the last 35 years. As a consequence most speakers of Māori under the age of 60 can be regarded as “new speakers”, that is speakers “with little or no home or community exposure to a minority language but who instead acquire it through immersion or bilingual programs, revitalization projects or as adult language learners” (O'Rourke, Pujolar and Ramallo 2015: 1).

Census data from 2013 shows that just under 600,000 New Zealanders indicate that they are Māori (13% of the total population of 4.5 million) and that there are 148,395 speakers of Māori (the majority (125,352) being people of Māori ethnicity). Just under a quarter (21.31%) of the Māori population can speak Māori to some extent. With regard to the level of fluency, 14% of Māori adults report being able to speak the language “well or very well” (Te Puni Kōkiri 2008: 19).

New Zealand has had a close association with Samoa dating from the period when the New Zealand Government administered Samoa from 1914–1952. The Samoan language was brought to New Zealand with Samoan migrants, with migration being particularly strong since the 1950s. As a consequence, Samoans are the largest Pacific ethnic group in New Zealand (144,138 people) with 62.7% being born in New Zealand (Statistics New Zealand n.d.a). The population in the Independent State of Samoa in 2013 was 190,652 (Samoa Bureau of Statistics 2017) meaning that nearly as many Samoans now live in New Zealand as live in the homeland. Samoan is not regarded as an endangered language in its land of origin.

Almost two-thirds of Samoan people (66.5% or 95,916 people) live in the Auckland region, and they comprise half of the Pacific population who live there (Auckland Council 2015: 8). The 51,336 speakers of Samoan in the Auckland area (Statistics New Zealand 2014: 25) comprise 60% of Samoan speakers in New Zealand as a whole.

The long term viability of any language relies on generating ongoing cohorts of child speakers. In this paper we focus on child speakers of both Māori and Samoan in New Zealand, in particular the rates of intergenerational transmission, in other words, the likelihood that a child who lives with a Māori or Samoan adult speaker is also a speaker of that language. The analysis reveals the respective influence of a range of factors which affect the rate

of intergenerational transmission of each of these languages. The statistical information provided in this paper will be useful for a range of research projects, including the sub-project *Emergent Bilinguals in the Digital World* (co-led by the second author) which is part of the National Science Challenge: “A Better Start - E Tipu e Rea”. This sub-project focuses on the digital and linguistic policies and practices affecting young Samoan- and Māori-speaking children in East Christchurch.

## 2. Data

Except where noted, all data used in this paper originates from the 2013 Census conducted by Statistics New Zealand. Much of the data is drawn from several commissioned datasets.

The Census data about language ability has some limitations. Firstly the responses are reported data, that is, respondents make their own determination as to whether they can speak a language or not. Thus the numbers cited are susceptible to both under or over reporting. Typically parents fill in the forms for their children and will make their own judgements as to whether the child can speak any particular language or not. In addition, the wording of the Census question (*in which language(s) could you have a conversation about a lot of everyday things?*) gives no indication of relative fluency. The only language in New Zealand for which aspects of fluency are surveyed is Māori where surveys have been conducted after the 2001 and 2006 Censuses (Te Puni Kōkiri 2002, 2008).

The main commissioned dataset used for this study comprises data for households where at least one person speaks Māori or Samoan. This dataset has been used to determine the rate of intergenerational transmission. That is, the likelihood that a child who lives in a household where an adult speaks a language also speaks that language. We term this the “intergenerational transmission rate”. Note that the dataset includes not only parents but also other adults who live in the household who also speak the target language. Affecting the data for Māori in particular, the dataset also includes a significant proportion of child speakers who were living in households where there were no adult speakers. This data was excluded when calculating the rate of intergenerational transmission.

We have excluded data for children under two years old since their speaking ability is limited. Accordingly the word “children”, unless otherwise

defined in this paper, refers to young people aged 2–18. The commissioned dataset is based on whether a household contains at least one Māori or Samoan speaker. In other words, the dataset is not based on ethnicity, meaning that a small number of adults and/or children who are not Māori or Samoan will be included in the results. This affects the Māori data more as we know that 15.5% of the number of speakers of Te Reo are non-Māori (Statistics New Zealand 2013b).

Due to differences in the parameters within which the data has been framed there may occasionally be some slight differences between numbers which are cited in different parts of the text. Other Census data cited in this paper is available on the *Statistics New Zealand* website (<http://www.stats.govt.nz/>). Data relating to education and schooling is sourced from the statistics section of the *Education Counts* website (<https://www.educationcounts.govt.nz/home>) where more recent data is available, but for the sake of consistency, data for 2013 is presented to provide comparison with the data from the 2013 Census. Data for Māori and Samoan child speakers overall is reported separately, with a further separate section focussing on data for both languages in Canterbury and Christchurch.

### 3. Child speakers of Māori

In 2013 the Census showed that there were 40,263 children in New Zealand aged 2–18 who indicated that they could have a conversation in Māori about a number of everyday things. About a third of these children (13,293) were living in a household where there wasn't an adult who could speak Māori. That leaves 26,970 children who speak Māori who live in a household where at least one adult can speak Māori. In other words, 67% of those children who are reported as being able to speak Māori live with an adult who speaks Māori, meaning that these children have an opportunity to be exposed to the Māori language in the home environment. Information from another report states that 61,300 (28%) of Māori children live in a household with at least one adult speaker of Māori (Te Puni Kōkiri 2008: 26).

There are 34,836 children who cannot speak Māori growing up in a household where an adult can speak Māori. Thus the intergenerational transmission rate for Māori is 43.6%. That is, 44% of children aged 2–18 who live in a household where there is at least one adult who speaks Māori are also speakers of Māori.



Table 1 shows the intergenerational transmission rates of Māori in different regions of New Zealand.

**Table 1: Intergenerational transmission rate of Māori among 2–18 year olds by region**

REGION	NUMBER OF SPEAKERS	TRANSMISSION RATE
Rest of North Island	24,030	47.2
Wellington	3,801	40.4
Auckland	8,070	39.5
Canterbury	2,250	35.6
Rest of South Island	2,112	34.2
<b>Total</b>	40,263	43.6

The Māori population is unevenly spread across New Zealand. The majority of Māori (60%) live in the northern half of the North Island (Research New Zealand 2014: 18). Children being raised as speakers of Māori are more likely to be living with a Māori-speaking adult if they reside in the North Island, and even more so if they live away from the two largest urban regions: Auckland and Wellington. Despite the fact that 30% of the Māori population live in Auckland, the rate of intergenerational transmission there is lower than that in the rest of the North Island. Areas where there are more Māori, such as the Far North District (60.6% of the population) or even parts of cities like Rotorua (70%) or the suburb of Aranui (23.9%) in Christchurch which is a high concentration of Māori for the South Island may provide a more amenable context for the intergenerational transmission of the language. Of course the ethnicity of the residents is only one factor and there are many valid reasons why families may not prioritise language transmission. Thus, data from Te Kupenga 2013 (Statistics New Zealand n.d.b) (a computer-supported individual survey of a sample of Māori in New Zealand) reveal that 40.5% of Māori in Northland report speaking Māori very well, well or fairly well and 23.1% of them claim to speak Māori at home regularly or as the main language. This can be compared to data from Canterbury where 13.5% of Māori claim to be able to speak Te Reo Māori very well, well or fairly well and 13.4% use it regularly at home. Those who have Māori as the main language at home in Canterbury were too few to report and the figure was suppressed

for reasons of privacy. Of those who regularly attend a club or interest group in Northland, 35.1% use no Māori when at the club compared to 55% in Canterbury. Interestingly, when helping at school, there seems to be pressure to use some Māori, so only 33% of Māori in Canterbury use no Māori then, compared to 24.3% in Northland.

Table 2 shows that the rates of intergenerational transmission also vary by age group with 2–6 year olds having the highest likelihood of being recorded as a being a speaker of Māori in a household where an adult speaks Māori.

**Table 2: Intergenerational transmission rate of Māori by age group**

AGE GROUP	NUMBER OF SPEAKERS	TRANSMISSION RATE
2–6	12,510	45.6
7–12	14,721	44.1
13–18	13,032	40.9

These results confirm data which indicates that Māori adults living with children are more likely to use Te Reo Māori with younger children. 34% of Māori adults use Te Reo Māori most of the time when communicating with their preschool children, 26% use Māori most of the time with their primary school-aged children, and 21% of Māori adults use Te Reo Māori most of the time with their secondary school-aged children (Te Puni Kōkiri 2008: 27–28). This pattern of diminishing input is commonly observed in heritage language situations (Montrul 2013: 172).

As with other minority languages, mothers play an important role in raising children as speakers of Māori. The intergeneration transmission rate for children living in households with Māori-speaking mothers is 49%, while for fathers it is 41%. While this is not a large difference, many more Māori-speaking children are being raised in a household with a Māori-speaking mother (53%) than those who live with a Māori-speaking father (24%). The majority of speakers of Māori in the 20–44 year old age group are female (57%) (Statistics New Zealand 2013a: Table 9). This could partly explain why more Māori-speaking children are being raised by mothers than fathers. Just under a quarter of Māori-speaking children (9,291) live with two or more Māori-speaking adults. However, only 2.5% of Māori-speaking children live with two Māori-speaking parents and at least one other Māori-speaking adult in the household.

Māori is a language undergoing revitalisation and the school system plays a strong role in the transmission of the Māori language to children. Table 3 shows a compilation of 2013 data taken from the Ministry of Education *Education Counts* website detailing the numbers of children enrolled in Māori Medium Education (MME). Māori medium education is defined as services where 51% or more of care or instruction is delivered in the medium of Māori. The overwhelming majority of children attending MME services are Māori.

**Table 3: Number of enrolments in MME by schooling level in 2013**

SCHOOLING LEVEL	NUMBER	% MĀORI
Preschool	10,181	94.4
Primary and secondary	17,343	97.3
<b>Total</b>	<b>27,524</b>	<b>96.2</b>

Presumably all these children would have indicated in the Census that they could speak Māori. As a result we can say that 68% of all the children who can speak Māori are attending MME schooling. Conversely, there are 12,739 children not in MME who are reported as being able to speak Māori.

#### 4. Child speakers of Samoan

The second largest number of child speakers of a language other than English in New Zealand are the 22,461 speakers aged 2–18 who speak Samoan. There are a further 16,635 children who cannot speak Samoan but who are growing up in a household with at least one adult Samoan speaker. Accordingly, the intergenerational transmission rate for Samoan is 55.4%. The commissioned dataset does not record the ethnicity of the Samoan-speaking children or adults, but we assume that the numbers of non-Samoans would be extremely low.

However, as shown in Table 4 this rate of intergenerational transmission is much higher in Auckland where the majority (70.9%) of Samoan child speakers live. Although Samoan is the second most spoken minority language in New Zealand overall, it has the largest number of child speakers of any minority language in Auckland, where there are nearly twice as many children who speak Samoan as there are children who speak Māori (15,921 compared to 8070).

**Table 4: Intergenerational transmission rate of Samoan among 2–18 year olds by region**

REGION	NUMBER OF CHILD SPEAKERS	TRANSMISSION RATE
Auckland	15,921	58.6
Rest of NZ	6,540	48.4
<b>Total</b>	22,461	55.4

The strong role of language transmission in the home in Auckland is evidenced by the fact that 96% of child speakers of Samoan in Auckland live in a household with at least one adult speaker compared to 87.7% in the rest of the country.

As shown in Table 5 the rates of intergenerational transmission also vary by age group with more speakers reported among older age groups than younger groups. This is a consistent effect and noted in other data which shows slightly higher rates amongst teenage speakers of Samoan (Statistics New Zealand 2007: 12). This effect seems likely to be the result of incoming Samoan-born teenagers being sent to New Zealand to pursue educational opportunities (Faifai 2016), as well as those arriving during childhood with their families. In 2015, 989 Samoans aged 19 and under were granted permanent residency in New Zealand (Tan 2016).

**Table 5: Intergenerational transmission rate of Samoan by age group and location**

AGE GROUP	NUMBER OF SPEAKERS	TRANSMISSION RATE	
		NEW ZEALAND	AUCKLAND
2–6	6561	53.8	56.8
7–12	7746	53.9	57.1
13–18	8151	58.1	61.6

As with other languages, the transmission rates are higher if there is a Samoan-speaking mother in the child's household (65% for New Zealand as a whole and 67% in Auckland). But the rates are also high if there is a Samoan-speaking father in the household (58% for New Zealand and 61.5% in Auckland). The rate of two parent households is high with only 9% of child

speakers living in a Samoan-speaking mother only household, and only 1.4% in a Samoan-speaking father only household.

Across New Zealand as a whole comparable numbers of Samoan-speaking children are being raised in a household with a Samoan-speaking mother (18,594) as those in a household with a Samoan-speaking father (15,012).

Data was also commissioned for place of birth for the Samoan-speaking children: “New Zealand” versus “elsewhere”. Here “elsewhere” stands as a proxy for Samoa as it is assumed that the vast majority of Samoan-speaking children born outside of New Zealand were born in Samoa. In support of this assumption, the 2013 Census records that 94% of Samoans born overseas gave Samoa as their birthplace (Statistics New Zealand 2007: 8).

Table 6 shows that there are higher rates of intergenerational transmission to Samoan-speaking children who were born overseas.

**Table 6: Intergenerational transmission rate of Samoan language by child’s birthplace**

BIRTHPLACE	NUMBER OF SPEAKERS	TRANSMISSION RATE
New Zealand	16,257	50.6
Elsewhere	5,853	81.2

Note, however, that the vast majority of New Zealand child speakers of Samoan (73.9%) were born in New Zealand compared to the rate of 62.7% for the Samoan population as a whole. A high proportion of children who speak Samoan (72%) live in households with two or more adult speakers of Samoan. Furthermore, 25.7% of Samoan-speaking children in New Zealand live with two Samoan-speaking parents and at least one other Samoan-speaking adult in the household. The rate in Auckland is a little higher at 27.4%.

But while the home is undoubtedly the major site of intergenerational transmission amongst the Samoan community there are a growing number of Early Childhood Education (ECE) services offering some level of Samoan immersion for preschoolers. In 2013, there were 374 such services, but the majority (283) were at the lowest level of immersion (1–11%). Only 57 centres were providing Samoan Medium Education, that is, more than 51% immersion in the Samoan language. The majority of these services (33) were in Auckland.

In 2013 there were 1068 students in 17 schools providing Samoan Medium

Education in New Zealand, with a further 3805 students learning Samoan as a subject.

## 5. Māori and Samoan child speakers in Canterbury and Christchurch

The region of Canterbury is second in size of population of New Zealand's 16 regions with a population of 539,436, 12.7 percent of New Zealand's population. The 2013 Census indicates that there were 116 languages spoken by 2–18 year old children in Canterbury. This is 70% of the 168 languages spoken by children throughout New Zealand. Furthermore, 17,313 children in Canterbury were recorded as speaking two or more languages. This is 12.4% of the children in the district. This is low compared to Auckland where an average of 29.1% of children speak two or more languages. However, within the South Island, Canterbury has the highest proportion of children who speak two or more languages, with the average for the whole of the South Island being 11.1%.

### 5.1 *Child speakers of Māori in Canterbury and Christchurch*

Seven percent of Māori live in the Canterbury region (41,910 people). There are 2250 children aged 2–18 in the wider Canterbury region who can speak Māori, the majority of whom (1503) live in Christchurch. The intergenerational transmission rate in Christchurch is 38.9% which is slightly higher than the rate for Canterbury as a whole (35.6%), and also higher than that for the rest of the South Island (34.2%). While the intergenerational transmission rate of Te Reo Māori in Christchurch is roughly similar to that in Auckland and Wellington (39.5% and 40.4% respectively) it is still lower than the national average of 43.6%.

Table 7 shows that, as with the national dataset, intergenerational transmission rates in Christchurch reduce as the child gets older.

**Table 7: Intergenerational transmission rate of Māori by age group in Christchurch**

AGE GROUP	NUMBER OF SPEAKERS	TRANSMISSION RATE
2–6	303	40.4
7–12	291	39.8
13–18	240	36.2

The intergenerational transmission rate is somewhat increased if the child has a mother who speaks Māori (44.6%, compared to 53% nationally). Of the Māori-speaking children who live in Christchurch, 669 do not live with an adult speaker (44.5%, compared to 33.0% nationally), indicating an increased reliance on language transmission via the school system in this region. In 2013 there were eight ECE services with 231 enrolments providing MME in Canterbury. In the same year there were 13 schools providing MME to 517 school-aged children in the region.

### *5.2 Child speakers of Samoan in Canterbury and Christchurch*

In 2013 only 7.1% of Pacific peoples (21,135 people) in New Zealand lived in the South Island (Statistics New Zealand 2014: 16). Canterbury was the South Island region where the largest number of Samoan people live (6,984 people or 4.8% of all Samoans in New Zealand). There are 1083 children aged 2–18 in the wider Canterbury region who can speak Samoan. Within Christchurch city 900 children aged 2–18 speak Samoan. The intergenerational transmission rate for Samoan is 57.1% for Christchurch (compared to 55.4% nationwide, and 58.6% for Auckland).

As shown in Table 8, and in line with the data nationally, intergenerational transmission rates of Samoan in Christchurch are highest amongst older children. Again, this may be because of the influx of Samoan-born children. These figures can be compared with those in Table 7 where the percentages of older child speakers of Māori are lower than those of younger child speakers. There is no corresponding contribution of monolingual child speakers of Māori, so the decline of the proportion of teenagers who report speaking Māori is probably a real tendency for some older children to stop using the minority language, as has been documented in other minority language contexts (Baker and Wright 2017:120).

The intergenerational transmission rates for Christchurch fall between those shown in Table 5 for Auckland and for New Zealand overall, suggesting that cities with larger communities of speakers have higher rates of intergenerational transmission. The transmission rate when the child lives with a Samoan-speaking mother in Christchurch is 67.8% (compared to 67% in Auckland). The rate when the child lives with a Samoan-speaking father in Christchurch is 59.7% (compared to 61.5% in Auckland). In Christchurch 68% of children who speak Samoan live in households with two or more adult speakers of Samoan. This compares with 72% nationally. The proportion of Samoan-speaking children in Christchurch who live with two parents and one

**Table 8: Intergenerational transmission rates of Samoan by age group in Christchurch and Auckland**

AGE GROUP	NUMBER OF SPEAKERS	TRANSMISSION RATE
2–6	276	55.7
7–12	297	55.1
13–18	327	60.4

or more other Samoan-speaking adult in house is 22%, slightly less than the national rate (25.7%) and the rate in Auckland (27.4%).

In 2013 there were 30 ECE services in the Canterbury region which offered some level of Samoan immersion. 25 were at the 1–11% level, 2 at the 51–80% immersion level and 2 at the 81–100% level. One school in Canterbury was providing Samoan Medium Education to 22 students with a further 50 students studying Samoan as a subject.

Table 9 gives an overview of comparative data for Māori and Samoan, which suggests that the higher rates of intergenerational transmission in Samoan families is strongly linked with the higher numbers of adult speakers of Samoan in most households.

## 6. Discussion

Māori and Samoan have the largest number of child speakers (40,263 and 22,461 respectively) of all minority languages in New Zealand followed by Hindi (10,388 child speakers) and Tongan (9,834). Despite these much larger populations, Māori and Samoan do not have the highest intergenerational transmission rates for languages other than English in New Zealand. Korean has by far the highest rate at 83% (King and Cunningham 2016: 88) with Samoan sixth at 55% and Māori fifteenth at 44%. The intergenerational transmission data presented here for Māori and Samoan highlight distinctive characteristics relating to each language and its speakers.

Many of the statistics relating to Māori highlight aspects related to it being a language undergoing revitalisation. Almost all of the other languages other than English spoken by children in New Zealand are languages with substantial populations of speakers in other parts of the world. Very few would be endangered languages. For the eighteen languages most spoken by children



**Table 9: Comparison data for Māori and Samoan in Auckland and Christchurch**

	AUCKLAND (REGION)		CHRISTCHURCH	
	MĀORI	SAMOAN	MĀORI	SAMOAN
Total number of speakers	29,253	51,336	8,277	4,059 <sup>1</sup>
Number of child speakers	8070	15,921	1,503	900
Ethnic group concentration	10.7%	7.2%	8.5%	1.5% <sup>2</sup>
Maximum ethnic group concentration	28%	30% <sup>3</sup>	23.9%	8.4%
% of child speakers in households with only one adult speaker	37.2	19.4	31.7	16
% of child speakers in households with two or more adult speakers	21.5	73.9	17.2	68.3
% of child speakers where Mother speaks	45.3	66.6	44.6	67.8
% of child speakers where Father speaks	36.5	61.5	37.4	59.7
Rate of intergenerational transmission	39.5	58.6	38.9	57.1

- 1 The 'total number of speakers' data was taken from Statistics New Zealand 2014: 25. Note that these figures in this row only are for Canterbury, not Christchurch.
- 2 The figure of 1.5% is extrapolated from figures which show 3.1% of the population of Christchurch is 'Pacific peoples' and a report that half of Pacific peoples in Christchurch are Samoan (Radio New Zealand 2011). Similarly, for the figure below where the proportion of Pacific peoples is highest in Aranui (16.8%).
- 3 The figure of 30% is extrapolated from figures that 60% of the population of the suburbs of Māngere-Ōtāhuhu are Pacific peoples and that just under half of Pacific peoples in New Zealand are Samoan (Statistics New Zealand 2014: 16).

in New Zealand, typically all but 2–3% of children who are recorded as being able to speak that language live in a household where at least one adult also speaks that language. In contrast, only 67% of children who are recorded as being able to speak Māori live in a household where there is at least one adult who speaks the language.

The reason why a large number of Māori-speaking children are growing up in households where no adults speak Māori is that the initial and continuing Māori language revitalisation efforts have focussed on children. In the late 1970s it was realised that few children were being raised as speakers of Māori (Benton 1991). As a consequence the initial thrust of Māori language revitalisation measures in the 1980s focussed on schooling options. *Kōhanga reo (language nests)* and *kura kaupapa Māori (Māori philosophy schools)* were

set up with the aim of immersing the child in a Māori-speaking environment. Initiatives which focus on supporting language transmission in the home have had a comparatively recent history.

Taking this context into account, the fact that 67% of children who speak Māori live with a Māori-speaking adult in fact indicates that the majority of Māori-speaking children have a good possibility of acquiring or reinforcing their school language in the home environment and shows the commitment that the majority of families with Māori-speaking children have made to ensure that their child grows up speaking Māori. The transmission rate for Māori also needs to be contextualised in that the parents who are transmitting Māori to their children are typically “new speakers” for whom fluency rates are low (only 14% of Māori adults can speak Māori “well” or “very well”). Another aspect which mitigates against language transmission is that most Māori-speaking children who do live with a Māori-speaking adult live with only one adult speaker. Only 25% of Māori-speaking children live with two or more Māori-speaking adults. This could be related to the fact that the rates of within-group marriage for Māori are around 53% although the rates are highest (around 67%) for those who are Māori speakers (Callister, Didham and Potter 2005: 30 & 64), indicating a higher level of social focus and cohesion amongst adult Māori speakers of Māori. Nevertheless the chances of two Māori-speaking Māori adults forming a relationship are not high.

The importance of the home as a site for language transmission was brought to the fore in New Zealand after a visit by Joshua Fishman in 2000. Fishman’s emphasis on the crucial role of the home in language revitalisation (Fishman 1991) was the inspiration for a range of tribal and national strategies and initiatives which aim to strengthen the use of Māori in the home, neighbourhood and community.

Another aspect of the results presented here is the fact that transmission rates in the North Island are higher away from the large cities of Auckland and Wellington. Benton (1991) notes that it was the rural heartlands in the early to mid 20th century which maintained intergenerational transmission of Māori the longest, and this difference seems to have been retained despite the fact that the revitalisation movement emerged, and has been strongest, in the larger urban centres. A good recent example of the importance of smaller communities as a site for language transmission is the small town of Ōtaki in the lower North Island with a population of just under 6,000. Ōtaki is home to a Māori tertiary institute, Te Wānanga o Raukawa. With a third of the town’s population identifying as Māori and just over half of the Māori population

of this town being bilingual (Statistics New Zealand n.d.c), community leaders are hoping that Ōtaki will become New Zealand's first bilingual town (Poulopoulos 2017). The larger town of Rotorua where 37.5% of the population identify as Māori of whom 29% speak the Māori language, as well as Wairoa (a small town in the Gisborne district) are also part of a recent proposal from the Māori Party for bilingual status of these towns.

The challenge then for those in larger urban environments is to facilitate activities which promote strong Māori language group cohesion. Christianity no longer plays a strong role in the Māori community with 46.3% of Māori stating 'no religion' in the 2013 Census (Statistics New Zealand, 2014: 30), a figure which is equivalent to European rates. It has been argued that the strong cohesive role of the marae has dissipated somewhat over the decades and that kapa haka (Māori performing arts) is serving the functions of a modern day marae (Papesch 2015: 22). There are annual kapa haka competitions for school children both regionally and nationally as well as an important biennial kapa haka competition for adults called Te Matatini. These competitions attract a full range of age groups as performers and spectators. The challenge is to channel this engagement to reinforce and create a sense of neighbourhood and community, particularly amongst Māori speakers. It may be easier to build up neighbourhoods and communities in small towns where Māori form a larger percentage of the population than in the larger cities where the Māori population is higher but less concentrated.

The profile for Samoan, as a migrant language rather than an indigenous language of New Zealand, is quite different. Most child speakers of Samoan (72%) live in a household with at least two Samoan speakers and 25% are living with three or more adult speakers. Data from 2001 show that Samoans have the second highest rate amongst Pacific peoples of marrying people from the same ethnic group (around 68%) (Callister, Didham and Potter 2005: 48). It is hoped that further research will investigate this in more detail. A majority of Samoans are Christian (only 17.5% Pacific peoples report having no religion (Statistics New Zealand 2014: 30)). All of these factors indicate that there are strong levels of social and cultural cohesion in the Samoan population which undoubtedly support intergenerational transmission.

This is particularly evident in Auckland, a city of 1.42 million people, where Samoan has its largest numbers of speakers and higher transmission rates than in other parts of the country. Auckland is the place of initial arrival for the vast majority of Samoans with links back to the home country maintained via the 1–2 daily flights to Samoa. A feature of Auckland school

scene is the annual Polyfest which began in 1976. This year the festival featured performances involving 9000 Māori students and others with ethnic ties to the Cook Islands, Niue, Samoa and Tonga (Fernandes 2017).

This paper is the first exploration of Census data which focusses on intergenerational transmission of Māori and Samoan. New Zealand has legislative responsibilities for ensuring the health of the Māori language and it can be argued that New Zealand also has responsibilities towards Pacific Island languages, including Samoan, as Auckland (New Zealand's largest city) has the largest Polynesian population of any city in the world. The fate of the Māori language and the result of the revitalisation efforts that surround it are being keenly observed from other parts of the world where indigenous and other languages are at risk and where there is a will to maintain the vitality of the languages before they are lost. The mechanisms that threaten or impede the intergenerational transmission of indigenous languages like Te Reo Māori are different from those that threaten or impede the intergenerational transmission of migrant languages like Samoan, but solutions that work in one case will often work in the other. This has been the case in other contexts, such as in Sweden where the indigenous Sami people gained facilities to support the intergenerational transmission of the Sami languages (notably community language education) as part of legislation introduced for migrant languages, even though the Sami languages had already been accorded the status of National Minority Languages (Monica Axelsson, personal communication, 1 April, 2017).

The findings reported here have implications for the transmission of Te Reo Māori in particular. We know that it makes a difference if there is more than one adult in the household who speaks the language, so those hoping to raise their children as speakers of Te Reo might find it easier to live in households with other adult speakers. This would support the children's language learning at school. We know that where Māori (or perhaps Māori speakers) form a higher proportion of the population of an area, there is more intergenerational transmission of the language. This makes situations such as the proposal to declare the towns of Ōtaki, Wairoa and Rotorua officially bilingual well worth watching.

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# THE EFFECT OF LANGUAGE AND SPATIAL INFORMATION ON THE PERCEPTION OF TIME IN MANDARIN AND ENGLISH SPEAKERS

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## Abstract

Existing studies suggest that English speakers conceptualize time on both the sagittal and transverse axes (Casasanto & Jasmin, 2012), whereas Mandarin speakers conceptualize time on both the sagittal and vertical axes (Boroditsky 2001; Scott, 1989). It has been suggested that the different temporal directions on the sagittal dimension between the two languages are likely to be caused by the different emphases of temporal sequences: deictic time vs. sequential time. While a large amount of literature has focused on differences across the two languages in terms of using different axes, very little has looked at differences that exist within axes. I report findings from English monolinguals, Mandarin monolinguals and Mandarin-English (ME) bilinguals on an explicit task that involves pointing directions for temporal words. It showed that English monolinguals associated the future with front and up; the overt encoding of metaphor has a significant effect in Mandarin but not in English. More importantly, ME bilinguals showed intermediate patterns. The current study tested cross-linguistic influences on the perception of temporal information. It found that when two languages encode time with different spatial words, both language and spatial cues can affect bilingual speakers' associations between time and directions. Future studies could test other languages, such as Māori, which see the past as ahead and the future as behind based on visual accessibility.

## 1. Background

### 1.1 Introduction

How do we perceive time? What are our mental representations of time? Time is an abstract concept, and it cannot be directly felt. We can see objects through our eyes and we can hear sound through our ears. However, we do not have an organ evolved to feel time. One possibility is that we sense time through motion (Lakoff, 1993). We sense time by perceiving objects moving and changing status. In other words, we sense time through sensory-motor experiences. Based on Conceptual Metaphor Theory (Lakoff & Johnson, 1980/2003), we store time in our mental representation in forms of space. The spatial mental representations of time can be revealed in several different phenomena. On the one hand, people talk about time by using spatial information (Casasanto & Boroditsky, 2008). We talk about an upcoming event as it is ahead of us, and we put our past behind us. At the same time, we provide temporal gestures accompanying speech, and these temporal gestures can reflect how time is structured in one's mind (Casasanto & Jasmin, 2012). On the other hand, spatial information can influence how people make temporal judgements (Boroditsky & Gaby, 2010; Casasanto, 2008; Matlock, Ramscar, & Boroditsky, 2005). Casasanto (2008) described an experiment which found that it was difficult for the English speakers to ignore a growing line on the screen when they tried to estimate temporal durations whereas it was difficult for the Greek speakers to ignore a glass that was being filled with water during the same temporal judgement task. These results are consistent with the fact that English uses length to describe duration but Greek uses volume such as *much time* instead of using *long time*.

Results from Casasanto (2008) also suggest that people's mental representation of duration can occupy a three-dimensional space. In fact, people's mental representation of time can be on any dimension in a three-dimensional space. The use of three-dimensional space is relevant to the current study and therefore will be elaborated in the next section.

### 1.2 Space-Time Relationships in Three-dimensional Space

Three-dimensional space consists of the sagittal, vertical and transverse dimensions. Many studies have demonstrated that human languages encode time on both the sagittal and vertical dimensions. However, people also think about time on the transverse dimension despite the fact that languages do not encode time by using terms such as left and right.



On the sagittal dimension, time is linear and therefore time has directions. Western cultures see time as a road extending forward into the future and backward to the past (Hall, 1976: 16). Such a view is different from some non-Western cultures such as Aymara (Núñez & Sweetser, 2006) and Māori (Thornton, 1987), which see the past as ahead and the future as behind because the past can be seen whereas the future is unknown. Apart from Aymara and Māori languages, some other languages also see the past as ahead and the future as behind, including languages spoken in Western cultures, for a different reason. In many languages, including languages spoken in Western cultures such as English and German, there are two types of temporal sequences/metaphors: deictic time and sequential time (Clark, 1973; Traugott, 1978).

Deictic time describes moments as their relationships to the current moment. In deictic time, the future is ahead and the past is behind, which has been discussed previously. For example, we can say *Christmas is ahead of us*. On the contrary, in sequential time, events are put on a sequential ordering and events are described in terms of their relationships between each other. In sequential time, the past/earlier events are ahead of the future/later events. For example, *Monday is before Wednesday*. Languages that have sequential time as the dominant temporal sequence, such as Mandarin (Yu, 2012), also see the past as ahead and future as behind. However, as discussed, although Mandarin seem to be similar to Aymara and Māori, fundamentally their temporal directions are caused by different frameworks.

On the vertical dimension, Mandarin heavily relies on vertical spatial words. In Mandarin, up is associated with the past and down is associated with the future (Scott, 1989). A corpus study (Chen, 2007) showed that Mandarin uses the vertical dimension to talk about time 40% of the time, which is probably higher than any other languages. English also uses the vertical dimension to describe time, such as in *passing down to generation*, down is associated with the future (Boroditsky, 2001). However, such an expression does not appear in pairs. Nevertheless, some expressions in English indeed appear in pairs and show that time has a direction on the vertical dimension in English. For example, the future is associated with the unknown and the past is associated with the known as in *It's up in air* and *settle down*. In this pair of expressions, up is associated with the unknown, in other words, the future, and down is associated with the known, which means the past (Radden, 2004).

On the transverse dimension, the direction of time is associated with cultural artifacts such as writing directions. A large amount of research

has found a close link between transverse temporal direction and writing directions across different languages (Dobel, Diesendruck, & Bölte, 2007; Fuhrman & Boroditsky, 2010) or for the same language that is written in different directions in different geographical regions (Bergen & Lau, 2012). Research also found that in English the transverse dimension is often used for sequential time whereas the sagittal dimension is often used for deictic time.

### *1.3 Perception of Time and Bilingualism*

One importance of studying conceptual metaphor is that it can be an approach to studying bilingualism (Jarvis, 2011). As a type of conceptual metaphor, temporal metaphor can reveal how and whether bilinguals learn new conceptualizations of time through using and learning another language when time is described differently in the two languages. Despite this, learning of new concepts such as new ways of conceiving time may not be reflected in language production. For example, it has been argued that deictic time is more easily activated than sequential time in English (Sell & Kaschak, 2011), whereas sequential time is the dominant temporal sequence in Mandarin (Yu, 2012). Several existing studies have tested how bilinguals of Mandarin and English perceive time, and it has been found that bilinguals with higher Mandarin proficiencies are more likely to use sequential time than bilinguals with lower Mandarin proficiencies (Fuhrman et al., 2011; Lai & Boroditsky, 2013). Their studies show that ME bilinguals with higher Mandarin proficiencies are more likely to associate the past with front, and the bilinguals in the English context were more likely to associate the future with front.

This type of potential effect of language is not reflected in language production, but exists in cognition and can be revealed by experimental tasks. The current study conducted an experiment on ME bilinguals and compared their behaviours with those from monolinguals of the two languages. By doing so, I reveal the effect of learning a second language on the perception of time.

### *1.4 Aims of the Current Research*

Previous research (e.g., Fuhrman et al., 2011) has looked at the within-dimensional difference between English and Mandarin. However, they only used the frontal space when testing temporal sequences (e.g., Fuhrman et al., 2011; Walker, Bergen, & Núñez, 2014), their study failed to test and find temporal directions on the sagittal dimension for both English and Mandarin. The current study was going to test the within-dimensional differences between Mandarin and English by using a different methodology.

The other aim was related to the fact that Mandarin heavily relies on spatial words when describing conventional temporal expressions. When observing a conversation in Mandarin, Chui (2011) found that the Mandarin speaker associated *zuotian* (yesterday) with back, but he also associated *zhiqian* (before now) with front. The latter result clearly revealed a possibility of an immediate effect of spatial information in temporal perception.

Previous studies also have found that Mandarin speakers are more likely to give vertical gestures when talking about temporal words with vertical spatial information (Gu, Mol, Hoetjes, & Swerts, 2014), and they are also likely to give sagittal responses when being prompted with sagittal spatial information (Lai & Boroditsky, 2013). The current study was going to explore the immediate effect of spatial information in Mandarin and look at whether Mandarin speakers behaved according to the spatial information. Therefore, the aims of the current study were:

1. to test Mandarin and English speakers' mental time lines on the three dimensions, and
2. to test whether overtly embedded Mandarin spatial cues can have immediate effects on Mandarin speakers, and
3. to compare results between bilinguals and monolinguals and find possible effect of language on temporal perception

## 2. Experiment

### 2.1 Methodology

#### 2.1.1 Experimental Task

The current study used a 3D pointing task that had been previously adopted by others (Boroditsky, 2001; Fuhrman & Boroditsky, 2010). The advantage of the 3D pointing task is that it uses a three-dimensional space rather than only using the space in front of people (e.g., Fuhrman et al., 2011). In such a task, a participant needed to point to a direction for each stimulus (a word). In the current study, a list of stimuli was created so quantitative data could be collected. The list consisted of 80 items, including fillers, which will be described in the following sections. The participants first needed to point directions for the 80 items in one condition, and then repeat the experiment in other three different conditions. The four conditions made a whole session of

the experiment. Whether doing one or two sessions was dependent on whether a participant was monolingual or bilingual (see below).

### *2.1.2 Participants*

10 native English speakers and 10 Mandarin-English (ME) late bilinguals were recruited by using public sign around the campus of the University of Canterbury, whose age were between 18 to 34. 10 Mandarin monolinguals were recruited in a vehicle research academy in ChangChun city in Mainland China. Their participation was for an exchange of shopping vouchers. As for the Mandarin monolinguals, their ages were between 30 and 40, and their jobs were to do vehicle testing. The Mandarin monolinguals' educational level was unknown, but based on the nature of their job, their education level was presumably high school and technological college graduates, and they reported that they had little knowledge about English. During the recruiting process, the native English speakers and the bilinguals were asked how many languages they can speak. The bilinguals also needed to answer when they learned English. These were to make sure that the native English speakers had no knowledge about Mandarin and the bilingual speakers did not learn English from childhood and did not speak Cantonese, and therefore, late bilinguals can be recruited. The reason is that it has been found that Mandarin proficiency has an effect of the likelihood of using sequential time in ME bilinguals (Fuhrman et al., 2011; Lai & Boroditsky, 2013). Late bilinguals are more likely to show the opposite temporal direction to that in English. We also asked them to answer a questionnaire that had six questions regarding the use of English. Their answers indicated that they were late ME bilinguals and used Mandarin every day.

### *2.1.3 Materials*

As noted above, the material was a list of eighty short words in both languages. In each language, there were twelve pairs of time-related words and some of them had overt spatial cues. The rest of the list was fillers. The fillers contained five pairs related to time of day, five pairs related to health, five paired related to emotion, five pairs of random words with positive and negative values, and sixteen non-paired random words. In each pair related to time of day, one was related to daytime and one was related to night. In each pair related to health and emotion, one had a positive meaning and the other one a negative meaning. The reason for including negative and positive

meanings in each pair was to include stimuli that were likely to elicit confident answers. There were two types of overtly embedded spatial cues.

1. The first type consisted of spatial cues in Mandarin Chinese on the sagittal dimension. In this type of cue, *qian* and *hou* are used for describing temporal sequences or deictic direction (there are disagreements among studies, but based on recent studies they are highly likely to be sequential). The Mandarin word *qian* means ‘before’ or ‘front’ in English, and it can be used in both spatial and temporal situations. The Mandarin word *hou* means ‘after’ or ‘back’ in English, and it also can be used as a spatial and a temporal reference. For example, a word *qian tian* (literal meaning would be front day) means the day before yesterday, and *liang-ge-yue hou* (literally means two months back) means two months later or in two months’ time depending on the context.
2. The second type consisted of spatial cues in Mandarin Chinese on the vertical dimension. In this type of cues, *shang* and *xia* were used for describing temporal information. The Mandarin word *shang* and *xia* means up or upper and low or lower in English respectively. For example, *shang ge yue* (literally means upper month) means last month and *xia ge yue* (literally means lower month) means next month.

Table 1 is a summary of spatial cues in the two languages. Note that there were four words in English containing before and after, however, because their existence was only a side-effect of translational equivalence, they were not the testing target in the current study. Preliminary analyses also suggested that the four English spatial cues had no effect on the English monolinguals and the bilinguals.

**Table 1: The numbers of each type of spatial cues for each time type in the two languages**

LANGUAGE TIME TYPE	MANDARIN		ENGLISH	
	PAST	FUTURE	PAST	FUTURE
type 1: Mandarin sagittal cue	5	5	0	0
type 2: Mandarin vertical cue	3	3	0	0
no cues	4	4	10	10

In order to make it easier for future references, the Mandarin cues *qian*, *hou*, *shang*, and *xia* (literally meaning front, back, up and down respectively) will be addressed as Mandarin-past-front cue, Mandarin-future-back cue, Mandarin-past-up cue and Mandarin-future-down cue respectively.

#### 2.1.4 Procedure

Monolingual English and Mandarin speakers did one session in their native languages, and bilingual speakers did two sessions in two different languages. Half of the bilinguals did the English part first in order to counterbalance. The two sessions for each bilingual were at least one week apart. Each of the eighty phrases appeared once in each condition. Words were also randomized in each condition and there were four conditions. The first condition was always an ‘any-direction’ condition, in which participants can point any direction they wanted when they saw the words. At the beginning of the first condition there were ten trials and the participants needed to point a direction for each of them. The ten words covered six directions: up, down, front, back, left and right, so after completing the ten words the participants knew that they can point freely in 3D space. The first condition served as a practice, and also suggested how people intuitively associate time with directions.

In the other three conditions, the participants’ pointing directions were restricted. The other three conditions were ‘front-back only’, ‘left-right only’ and ‘up-down’ only. The three restricted conditions were in random orders. At the beginning of each of the three follow-up conditions, instructions appeared on the screen which told them that they can only point in two opposing directions on one dimension, and in each of the three conditions the participants only pointed two directions. The whole experiment was designed and run in E-prime 2.0. The experiment started by showing three pages of instruction, which told the participants to press the SPACE key to see the next word, and that they must always use the same hand to press as they have used to point. This was to avoid the tendency that people might repeat their previous action. There were three minutes between conditions so they could rest their hands for a while. The experiment for each participant was video-recorded. All of the responses were coded manually and double-checked by an external RA before any further analyses.

#### 2.1.5 Hypotheses

Referring to the aims of the experiment, I hypothesize the following potential results based on the past research. The hypotheses are based on existing

studies on English and Mandarin speakers' mental representation of time. The hypotheses are listed in Table 2.

**Table 2: Hypotheses on the association between time and direction on the three dimensions for the two languages. The hypotheses are for both the any-direction condition and the restricted conditions. Grey cells indicate the participants' primary dimension in the any-direction condition, n/a: not applicable.**

GROUP	DIMENSION	RESULT	
English condition (monolinguals and bilinguals)	sagittal	Front for the future more often than for the past	
	vertical	Up for the future more often than for the past	
	transverse	Right for the future more often than for the past	
Mandarin condition (monolinguals and bilinguals)		HAVING CUES	NO CUES
	sagittal	Back for the future more often than for the future	Front for the future more often than for the past
	vertical	Up for the past more often than for the future	Up for the past more often than for the future
	transverse	n/a	Right for the future more often than for the past

### 3. Results

Data from each of the four conditions was analyzed separately. Data was analyzed in mixed effect logistic regression models in R (R Development Core Team, 2015) with packages Lme4 (Bates, Mächler, Bolker, & Walker, 2015) and LanguageR (Baayen, 2013). In each condition, the first model contained word and participants as random intercepts and the interaction between time type (past vs. future) and language group/context as a fixed effect. After that, for each language group/context, a second model was tested. Preliminary analyses showed that English spatial cues such as before and after had no effects on the English monolinguals and the bilinguals in the English condition. Therefore, only time type was tested for the English monolinguals

and the bilinguals in the English condition. As for the bilinguals in the Mandarin condition and the Mandarin monolinguals, the interaction between time type and spatial cues was tested.

The order of the results will be as follows. I will first present results on the sagittal dimension, followed by those on the vertical and transverse dimensions. On each dimension, I will first present the overall results from the any-direction condition; and then I will present results on the sagittal, vertical and transverse dimensions.

### *3.1 Overall Tendencies*

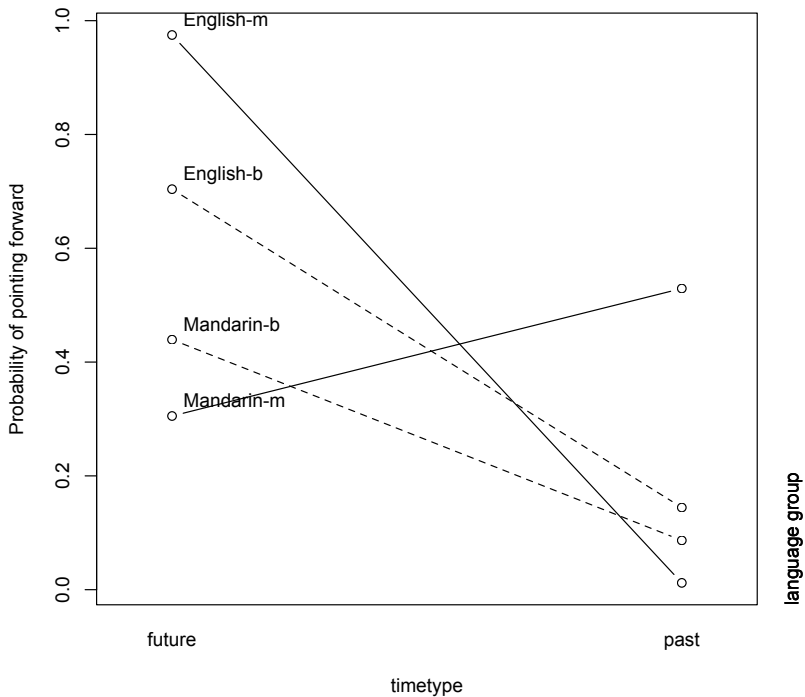
When analyzing responses of temporal words in the any-direction condition, I first ran Wilcoxon tests by word and by subject within each of the three axes between language groups or contexts. Results from tests by subject show that the Mandarin monolinguals used the vertical axis significantly more often than the English monolinguals ( $p < .01$ ). Results from tests by word also reveal a similar result on the vertical axis ( $p < .0001$ ), and the Mandarin monolinguals used the sagittal and the transverse axes significantly less often than the English monolinguals ( $p < .0001$  and  $p < .0001$ ). The bilinguals in the English condition used the sagittal and the vertical axes more often ( $p < .05$  and  $p < .05$ ), and used the transverse axis less often than the English monolinguals ( $p < .0001$ ). The Mandarin monolinguals used the vertical and the transverse dimensions more often ( $p < .01$  and  $p < .001$ ), and used the sagittal dimension less often than the bilinguals in the Mandarin condition ( $p < .0001$ ).

### *3.2 Sagittal Responses from the Any-direction Condition*

When testing sagittal responses in the mixed effect logistic regression model, it was found that the interaction between language group/context and time type was significant ( $p < .001$ ). The different patterns across groups can be seen in Figure 1, and the result of the model can be found in Appendix in Table 8.

Figure 1 shows that the English monolinguals strongly associated front with the future, and back with the past. The results of the regression model showed that the effect of time type was significant ( $p < .001$ ). The bilinguals in the English context also reveal a similar pattern ( $p < .001$ ), but not as strong as the English monolinguals. The bilinguals in the Mandarin condition seemed to have no preference to associate the future with either front or back and they associated back with the past. The Mandarin monolinguals mostly associated back with the future and they seemed to have no preference to associate the past with either front or back.





**Figure 1:** Plot for the results of the model testing the interaction between language group and time type for the participants' responses on the sagittal dimension in the any-direction condition, b/dashed line: bilinguals, m/solid line: monolinguals.

When running tests for the effect of sagittal cues, we found that Mandarin sagittal cues significantly interacted with time type for the bilinguals in the Mandarin context ( $p < .05$ ) and the Mandarin monolinguals ( $p < .05$ ), both groups pointed back more often for the future when there were Mandarin-future-back cues, and they pointed front more often for the past when there were Mandarin-past-front cues. These results suggest that Mandarin sagittal cues have immediate effects in Mandarin and they can be revealed in Figure 2.

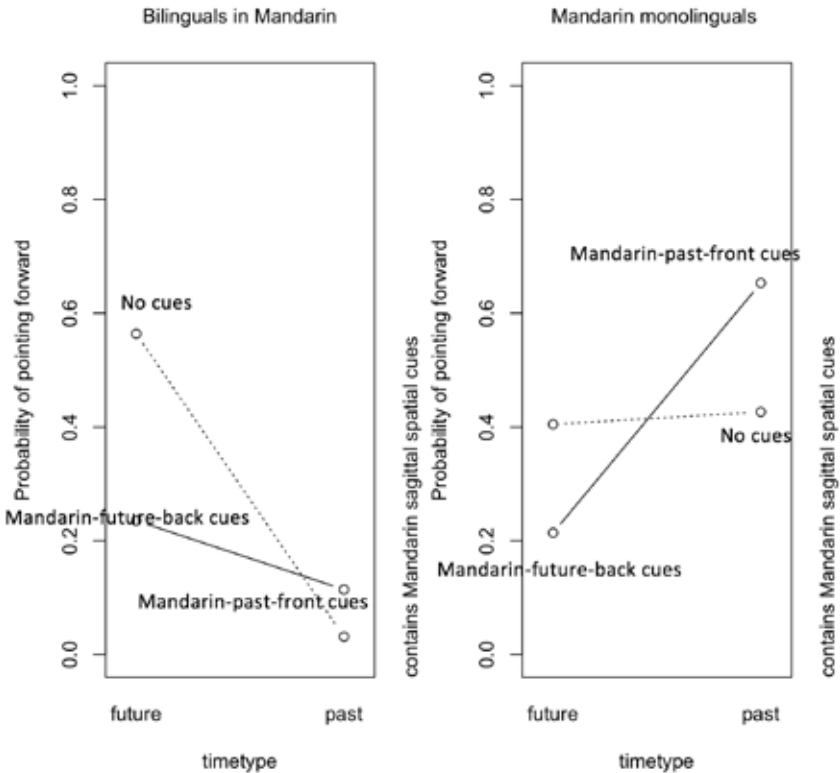
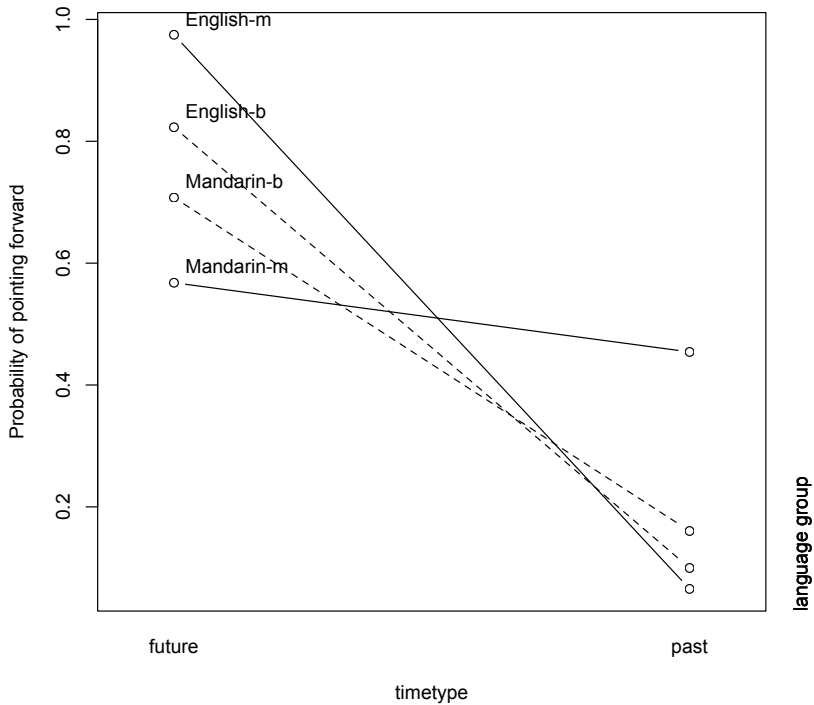


Figure 2: Plots for the results of the models testing the interaction between time type and Mandarin sagittal cues for the bilinguals in the Mandarin condition (left) and the Mandarin monolinguals (right) in the any-direction condition, dashed line: words without cues, solid line: words with sagittal cues.

### 3.4 Responses from the Sagittal-only Condition

When being forced to provide responses on the sagittal axis, language group significantly interacted with time type ( $p < .001$ ). Both the English monolinguals and the bilinguals in the English condition showed significant preferences toward front for the future, and back for the past, however, the preference was stronger for the former group ( $p < .001$ ) than for the latter ( $p < .001$ ). The bilinguals in the Mandarin context pointed forward for the future and backward for the past both less often than when they were in the English context. The Mandarin monolinguals showed the weakest front-future and



**Figure 3:** Plot for the results of the model testing responses in the sagittal-only condition across three groups, b/dashed line: bilinguals, m/solid line: monolinguals

back-past associations. The results of the model are plotted in Figure 3, and given in Appendix in Table 9.

When conducting analyses for the bilinguals in the Mandarin condition and the Mandarin monolinguals, it was found that the interactions between time type and Mandarin spatial cues for both groups were near-significant ( $p = 0.085$  and  $0.083$  respectively). Both groups pointed front for the future less often when there were Mandarin-future-back cues, and pointed back for the past less often when there were Mandarin-past-front cues, but the effect of Mandarin cues was stronger for the Mandarin monolinguals than for the bilinguals. The interactions for both groups are plotted in Figure 4.

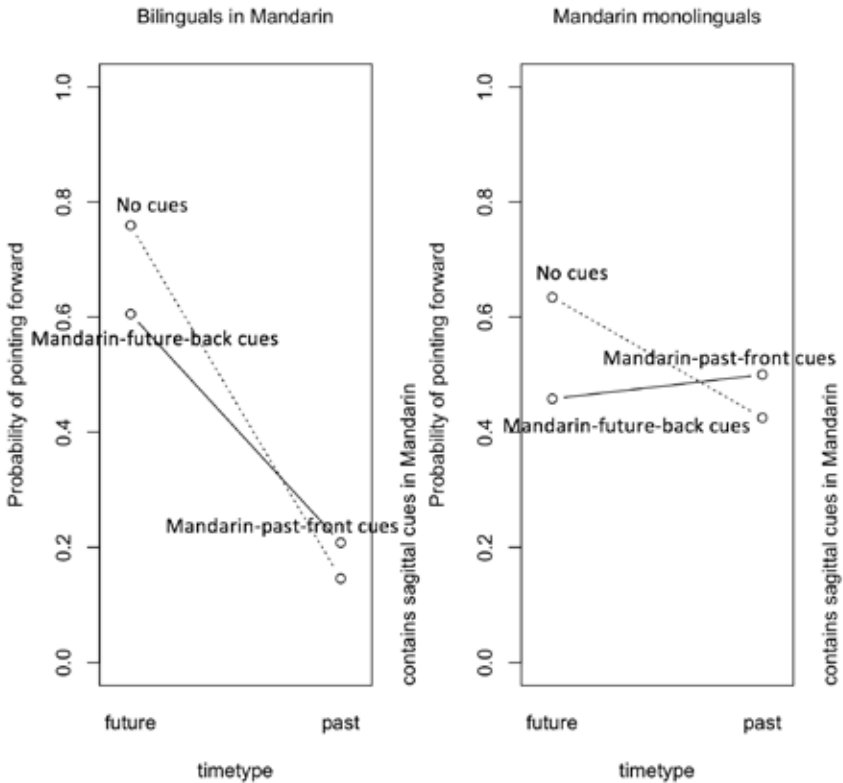
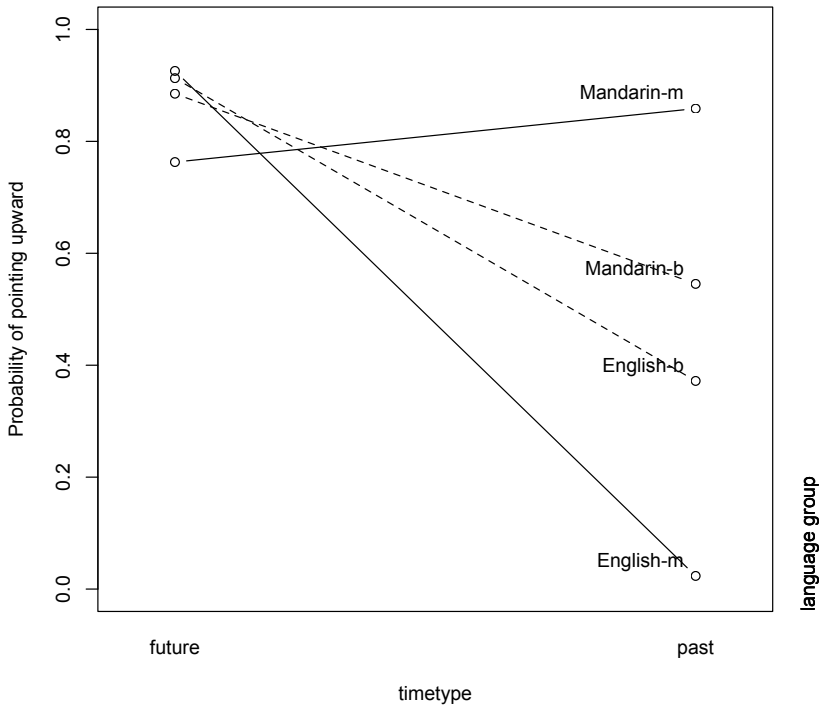


Figure 4: Plots for the results of the models testing the interaction between time type and sagittal cues for the Mandarin monolinguals (right), and the bilinguals in the Mandarin context (left). Solid line: temporal words that contained sagittal directional cues in Mandarin, dashed line: temporal words that did not contain sagittal directional cues in Mandarin

### 3.5 Vertical Responses from the Any-direction Condition

When testing vertical responses in the any-direction condition, language also significantly interacted with time type ( $p < .05$ ). The English monolinguals strongly associated up with the future and down with the past ( $p < .001$ ). The bilinguals also showed the similar pattern but not as strong as the English monolinguals ( $p < .05$ ). The bilinguals in the Mandarin context also strongly associated up with the future; however, their association between down and the past was weak. The Mandarin monolinguals' association between up and

the past was strong; however, they mostly associated up with the future. The different patterns across groups can be seen in Figure 5. The results of the model are given in Table 10 in Appendix.



**Figure 5: Plot for the results of the model testing the interaction between language group and time type for the participants' responses on the vertical dimension in the any-direction condition, b/dashed line: bilinguals, m/solid line: monolinguals**

Vertical spatial cues were tested in Mandarin. Vertical cues significantly interacted with time type for the bilinguals in the Mandarin condition and the Mandarin monolinguals. The bilinguals in the Mandarin condition ( $p < .001$ ) pointed down more often for the future when there were Mandarin-future-down cues, and they pointed up more often for the past when there were Mandarin-past-up cues. The Mandarin monolinguals almost categorically pointed down for the future and up for the past when there were vertical cues and they did not show

any preferences when there were no vertical cues. The results for the bilinguals in the Mandarin condition are plotted in Figure 6. The Mandarin monolinguals' responses for words with vertical cues were too sparse to explore reliably in regression models, and therefore, their responses for words with vertical cues are summarized in Table 3.

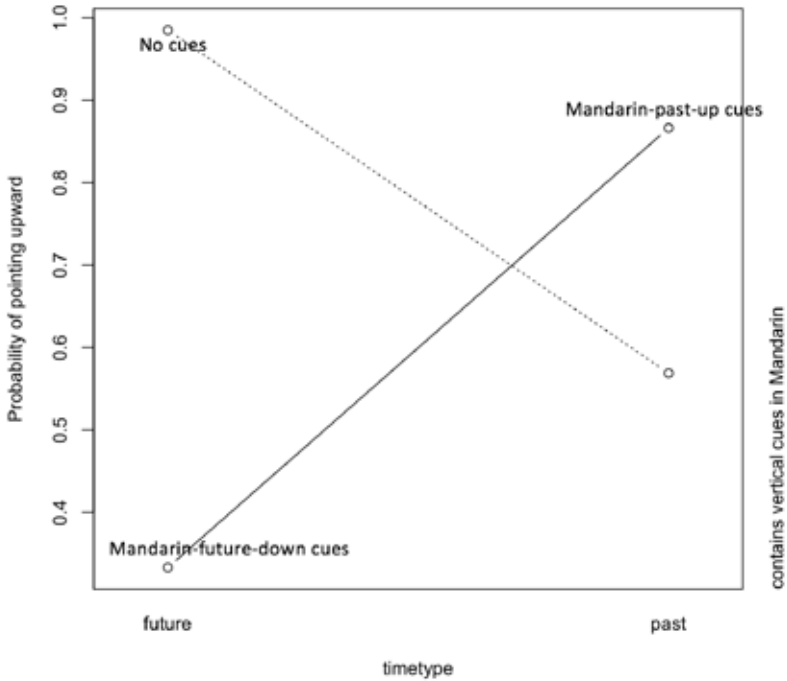


Figure 6: Plot for the results of the models testing the interaction between time type and Mandarin vertical cues for the bilinguals in the Mandarin condition, dashed line: words without cues, solid line: words with sagittal cues.

Table 3: Mandarin monolinguals' vertical responses for temporal words with vertical cues in the any-direction condition

	DOWN	UP
Future	9	3
Past	0	16

### 3.6 Responses from the Vertical-only Condition

When testing responses on the vertical axis, it was found that language group/context significantly interacted with time type ( $p < .001$ ). Both the English monolinguals and the bilinguals in the English context showed significant preferences toward up for the future, and down for the past and the preference was stronger for the English monolinguals ( $p < .001$ ) than for the bilinguals ( $p < .001$ ). Both the bilinguals in the Mandarin context and the Mandarin monolinguals showed weak preferences, and the preference for the Mandarin monolinguals was weaker than the bilinguals. The differences across groups/conditions can be seen in Figure 7. The results of the model are in Table 11 in Appendix.

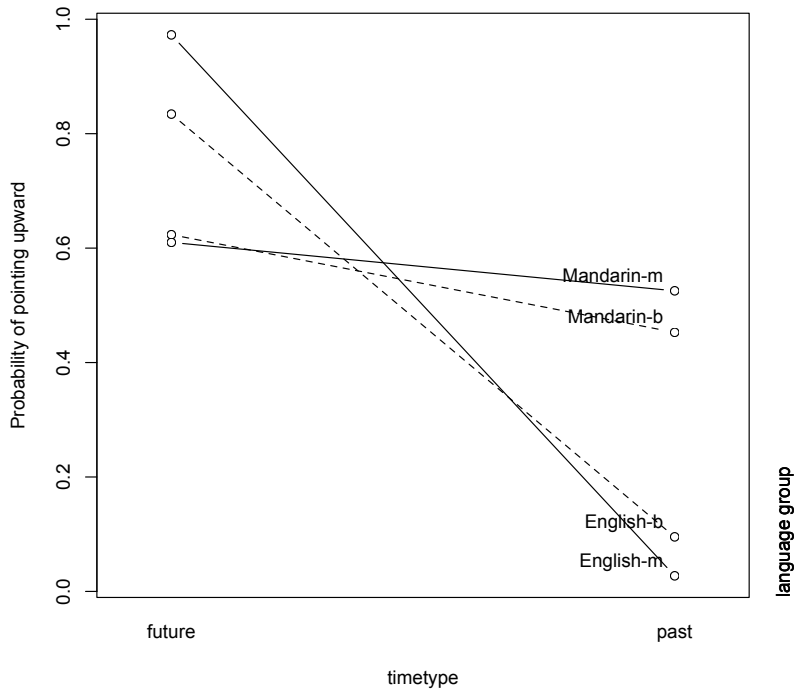


Figure 7: Plot for the results of the model testing responses in the vertical-only condition across three groups, b/dashed line: bilinguals, m/solid line: monolinguals

When testing the effect of Mandarin vertical cues, it was found that vertical cues significantly interacted with time type for the bilinguals in the Mandarin context ( $p < .001$ ) and the Mandarin monolinguals ( $p < .001$ ). Both groups pointed up more often for the future than for the past when there were no cues, and they pointed down for the future more often than for the past when there were Mandarin-future-down cues. The significant interactions for both groups can be revealed in Figure 8.

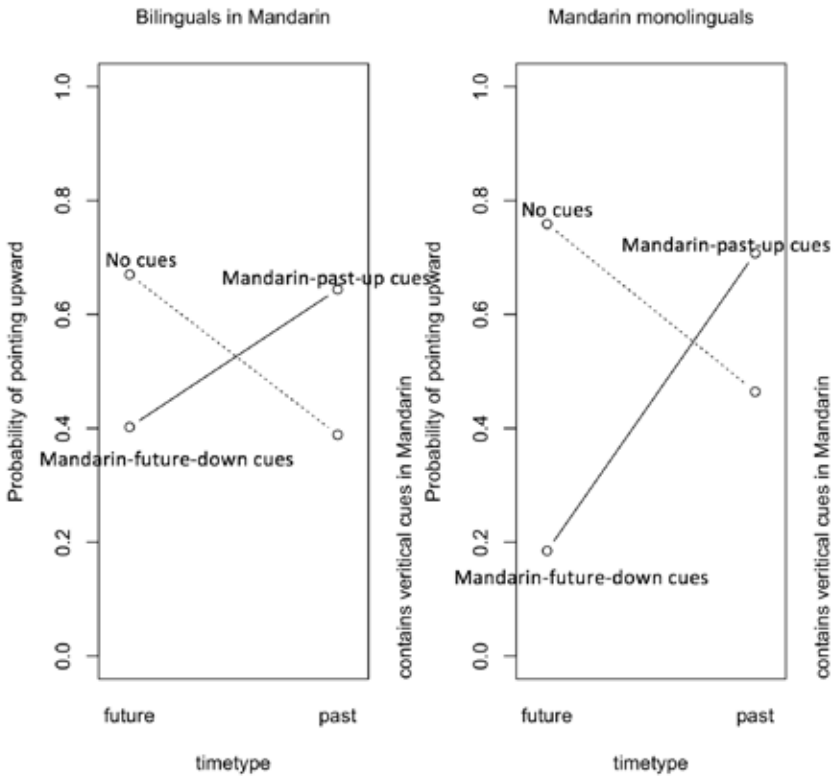


Figure 8: Plots for the results of the models testing the interaction between time type and vertical cues for the Mandarin monolinguals (right), and the bilinguals in the Mandarin context (left). Solid line: temporal words that contained sagittal directional cues in Mandarin, dashed line: temporal words that did not contain vertical directional cues in Mandarin



### 3.7 Transverse Responses from the Any-direction Condition

For responses on the transverse dimension from the any-direction condition, it was found that the data was too sparse to explore reliably in regression models except for the Mandarin monolinguals; however, they did not show any significant results. Therefore, each language group/condition was analyzed separately. The numbers of responses for each group except for the Mandarin monolinguals are listed in Table 4, 5 and 6.

**Table 4: The English monolinguals' transverse responses for temporal in the any-direction condition**

	LEFT	RIGHT
Future	0	34
Past	32	0

**Table 5: The bilinguals' transverse responses in the English condition for temporal in the any-direction condition**

	LEFT	RIGHT
Future	0	13
Past	11	0

**Table 6: The bilinguals' transverse responses in the Mandarin condition for temporal in the any-direction condition**

	LEFT	RIGHT
Future	1	9
Past	8	0

### 3.8 Responses from the Transverse-only Condition

When testing responses from the transverse-only condition, it was found that language significantly interacted with time type ( $p < .001$ ). English monolinguals strongly associated the future with right and the past with left ( $p < .001$ ). The bilinguals in the English condition ( $p < .001$ ), the bilinguals in the Mandarin condition ( $p < .01$ ) and the Mandarin monolingual ( $p < .01$ )

also showed the similar patterns, which were not as strong as English monolinguals. The differences across groups can be revealed in Figure 9. The results of the model are in Table 12 in Appendix.

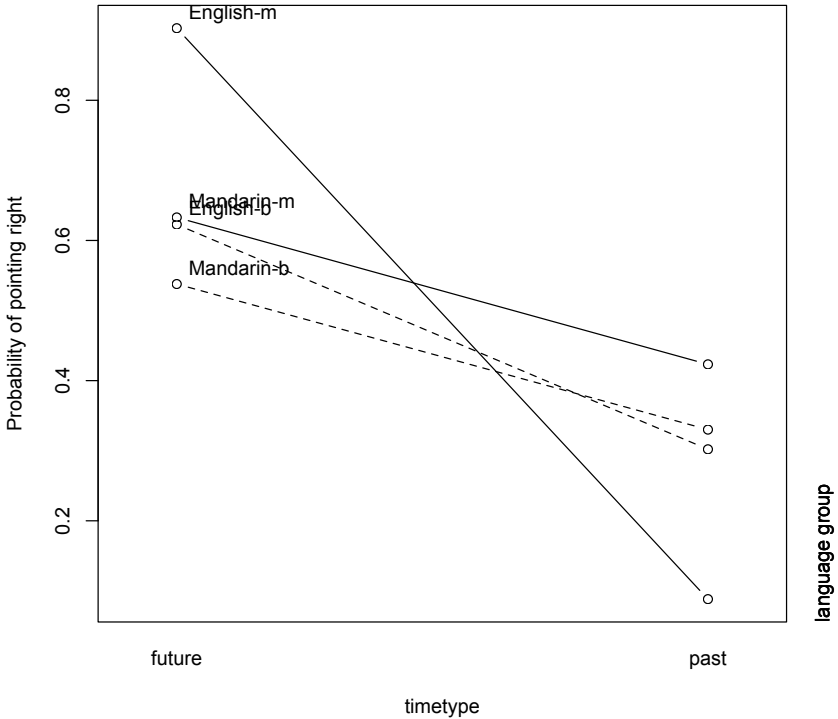


Figure 9: Plot for the results of the model testing responses in the transverse-only condition across three groups, b/dashed line: bilinguals, m/solid line: monolinguals

### 3.9 Correlation between the sagittal and the vertical dimensions

The participants associated up with the future and down with the past when there were no vertical cues. Such a preference exists in theory but existing studies did not find it when testing English speakers. It was suspected that this might be a projection from the sagittal axis. Therefore, after removing responses for the temporal words, Spearman's correlations between the sagittal and the vertical axes on the fillers for the English monolinguals, the bilinguals in the English context and in the Mandarin context, and the

Mandarin monolinguals were tested and the results were 0.931, 0.881, 0.764 and 0.760 respectively. When testing the differences between correlations, we used the Fisher *r*-to-*z* transformation and found significant differences between them:  $z = 1.68$  and  $p = 0.0465$  between the first two,  $z = 2.1$  and  $p = 0.0179$  between the second and the third one, and  $z = 0.06$  and  $p = 0.4761$  between the last two, which shows no significant differences.

A regression model was also conducted on responses for the fillers. The model use responses from the vertical-only condition as the dependent variable, the interaction between language group and responses from the sagittal-only condition as a fixed effect, and participants and words as random intercepts. The results revealed a significant interaction between sagittal responses and language ( $p < .001$ ). When a word was pointed as front, the English condition would significantly increase the likelihood of pointing it as up for both the English monolinguals and the bilinguals in the English condition, and the likelihood was stronger for the group than for the latter.

#### 4. Discussion

The results of the current experiment are summarized in Table 7. Speaking overall, all the groups of the participants chose the sagittal dimension as the primary dimension to point for temporal words when they could point freely. Such a result is consistent with the fact that English speakers use the sagittal dimension to gesture time when producing elicited gestures (Casasanto & Jasmin, 2012), and Mandarin speakers use the sagittal dimension to talk about time more often than the vertical one (Chen, 2007).

On the sagittal dimension, the English monolinguals showed consistent patterns between the any-direction condition and the restricted condition. They pointed front for the future more often than for the past, which is consistent with deictic time in English (Boroditsky, 2000). The bilinguals in the English context behaved like the English monolinguals, and they showed consistent patterns between the two conditions.

The bilinguals in the Mandarin context pointed front for the future more often than for the past when there were no overt sagittal cues; however, they pointed front less often for the future and pointed back less often for the past when there were cues. Although sagittal cues had an effect on them, it was not strong enough to change their associations between time and directions. The Mandarin monolinguals showed no preferences when there were no overt

**Table 7: A summary of the results collected from all the conditions across language groups. Grey colour: the results that are inconsistent with the hypotheses, n/p: no preferences, n/a: not applicable.**

GROUP	DIMENSION	RESULT-ANY DIRECTION CONDITION		RESULT-RESTRICTED CONDITIONS	
		HAVING CUES	NO CUES	HAVING CUES	NO CUES
English monolinguals	sagittal	Front for the future more often than for the past	Front for the future more often than for the past	Front for the future more often than for the past	Front for the future more often than for the past
	vertical	Up for the future more often than for the past	Up for the future more often than for the past	Up for the future more often than for the past	Up for the future more often than for the past
	transverse	right for the future more often than for the past	right for the future more often than for the past	right for the future more often than for the past	right for the future more often than for the past
Bilinguals in English	sagittal	Front for the future more often than for the past	Front for the future more often than for the past	Front for the future more often than for the past	Front for the future more often than for the past
	vertical	Up for the future more often than for the past	Up for the future more often than for the past	Up for the future more often than for the past	Up for the future more often than for the past
	transverse	Right for the future more often than for the past	Right for the future more often than for the past	Right for the future more often than for the past	Right for the future more often than for the past
Bilinguals in Mandarin	sagittal	Front for the future more often than for the past	Front for the future more often than for the past	Front for the future more often than for the past	Front for the future more often than for the past
	vertical	Up for the past more often than for the future	Up for the future more often than for the past	Up for the past more often than for the future	Up for the future more often than for the past
	transverse	n/a	Right for the future more often than for the past	n/a	Right for the future more often than for the past
Mandarin monolinguals	sagittal	Back for the future more often than for the past	n/p	Back for the future more often than for the past	Front for the future more often than for the past
	vertical	Up for the past more often than for the future	n/p	Up for the past more often than for the future	Up for the future more often than for the past
	transverse	n/a	n/p	n/a	Right for the future more often than for the past

sagittal cues in the any-direction condition, and they pointed front less often for the future and pointed back less often for the past when there were sagittal cues.

The Mandarin monolinguals behaved like the bilinguals in the Mandarin condition in the sagittal-only condition when there were cues; however, the effect of the cues was stronger for them than for the bilinguals. The Mandarin monolinguals showed no preference on the sagittal dimension in the any-direction condition when there were no cues. It seemed temporal direction on the sagittal dimension was salient for them only when sagittal cues existed. However, the effect of sagittal cues was consistent across the two conditions for them. The immediate effect of sagittal cues in Mandarin is consistent with Chui's (2011) observation, in which it was found that the Mandarin speakers pointed a past word with a sagittal cue and a past word without it in different directions. The two different temporal directions from the Mandarin speakers show that both deictic time and sequential time exist in Mandarin. Yu (2012) suggests that the temporal direction of sequential time in Mandarin is consistent with the direction that is described by Mandarin overt sagittal cues, which are front-past and back-future.

On the vertical dimension, the English monolinguals and the bilinguals in the English condition behaved in similar ways. Both groups also showed similar patterns between conditions. They all pointed up for the future more often than for the past. This result is consistent with the vertical temporal direction in English according to CMT (Lakoff & Johnson, 1980/2003). The bilinguals in the Mandarin condition also showed a similar pattern when there were no overt vertical cues. However, they pointed up for the past more often than for the future when there were cues. As for the Mandarin monolinguals, the effect of vertical cues is consistent in both conditions. However, when there were no vertical cues, they had no preference in the any-direction condition and they pointed up for the future more often than for the past in the vertical-only condition.

The up-future/down-past mapping is not supported by Mandarin linguistic data; however, it theoretically exists in English despite the fact that it has never been observed. It was found that when looking at the fillers, the participants' sagittal responses can predict their vertical responses. Correlation tests also reveal that there might be a close connection between the two dimensions. It seems the Mandarin speakers' up-future/down-past associations might be a projection from their front-future/back-past associations on the sagittal dimension. However, they had the weakest correlations. Future studies can test such a possibility.

On the transverse dimension, almost all the participants associated left with the past and right with the future, which is consistent with the writing direction in both Mandarin and English, given the fact that most of the Mandarin speakers in the current study are from mainland China. Only Mandarin monolinguals showed no preference in the any-direction condition.

As we can see, the current study found potential within-dimensional differences. The differences are caused by both languages of the stimuli and spatial information in the stimuli. Sagittal cues in Mandarin reflect temporal direction of sequential time (Yu, 2012), which is future-back and past-front. Sagittal cues had effects on the Mandarin-speaking groups/condition, but had no effects on the English-speaking groups/condition. This is consistent with the idea that sequential time is dominant and less restricted in Mandarin (Yu, 2012), whereas deictic time is more easily activated than sequential time in English (Sell & Kaschak, 2011). The immediate effects of spatial cues are also consistent with the immediate effects found from existing studies (e.g., Lai & Boroditsky, 2013). Taken together, they suggest that Mandarin speakers are sensitive to spatial information in temporal expressions, which is consistent with the fact that Mandarin heavily relies on spatial words when describing time.

The other important finding is that the bilinguals in the English condition behaved in similar patterns to the English monolinguals, whereas when the bilinguals were in the Mandarin condition, they behaved in similar patterns to the Mandarin monolinguals. Despite the fact that the bilinguals' associations between time and directions were significantly weaker than those from the monolingual counterparts, the effect of language was clearly revealed. The bilinguals showed intermediate patterns between the English monolinguals and the Mandarin monolinguals most of the time.

## 5. Conclusion

The experiment found differences and similarities in each dimension between groups of speakers. It used a pointing task, which was to mimic deictic gestures and temporal gestures, to test English and Mandarin speakers' perception of time in a real 3D environment with and without restricted conditions. The pointing experiment established a baseline for each language group on how they explicitly associate time with directions in the current New Zealand context. It provides references for future studies that will further test

the implicit association between time and directions across the two languages. The current study can also serve as a stepping stone for anyone who wishes to test Māori-English bilinguals in New Zealand in the future. Since Māori language has a temporal direction that is opposite to deictic time in English based on visual accessibility instead of focusing on sequential time, studying bilinguals of Māori and English would provide strong evidence for cross-linguistic influence on conceptual structures.

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## Appendix

**Table 8: The results of the model testing the interaction between time type and language for the participants' sagittal responses in the any-direction condition, time type: future vs. past**

	ESTIMATE	STD. ERROR	Z VALUE	PR(> Z )	
(Intercept)	0.8657	0.3241	2.671	<0.01	**
languagegroup= English-monolingual	2.7899	0.7951	3.509	<0.001	***
languagegroup= Mandarin-bilingual	-1.1092	0.3661	-3.03	<0.01	**
languagegroup= Mandarin-momolingual	-1.6883	0.4631	-3.646	<0.001	***
timetype=past	-2.645	0.4507	-5.869	<0.001	***
languagegroup= English-monolingual: timetype=past	-5.4239	1.3049	-4.157	<0.001	***
languagegroup= Mandarin-bilingual: timetype=past	0.5325	0.6221	0.856	0.392028	
languagegroup= Mandarin-monolingual: timetype=past	3.5848	0.6145	5.834	<0.001	***

**Table 9: The result of the model testing responses in the sagittal-only condition across three groups, time type: future vs. past**

	ESTIMATE	STD. ERROR	Z VALUE	PR(> Z )	
(Intercept)	1.5367	0.3534	4.349	<0.001	***
language= English-monolingual	2.1201	0.6176	3.433	<0.001	***
language= Mandarin-bilingual	-0.6528	0.3324	-1.964	<0.05	*
language= Mandarin-monolingual	-1.2635	0.3945	-3.203	<0.01	**
time=typepast	-3.7374	0.4775	-7.826	<0.001	***
language= English-monolingual: time=typepast	-2.58	0.7382	-3.495	<0.001	***
language= Mandarin-bilingual: time=typepast	1.198	0.5169	2.318	<0.05	*
language= Mandarin-monolingual: time=typepast	3.2808	0.4882	6.72	<0.001	***

**Table 10: The results of the model testing the interaction between time type and language for the participants' vertical responses in the any-direction condition, time type: future vs. past**

	ESTIMATE	STD. ERROR	Z VALUE	PR(> Z )	
(Intercept)	2.3499	0.9309	2.524	<0.05	*
languagegroup= English-monolingual	0.1752	1.2753	0.137	0.89073	
languagegroup= Mandarin-bilingual	-0.3071	0.7906	-0.388	0.69771	
languagegroup= Mandarin-monolingual	-1.1806	0.9584	-1.232	0.21801	
timetype=past	-2.8738	1.1503	-2.498	<0.05	*
languagegroup= English-monolingual: timetype=past	-3.3789	1.7907	-1.887	<0.1	
languagegroup= Mandarin-bilingual: timetype=past	1.013	1.2	0.844	0.3986	
languagegroup= Mandarin-monolingual: timetype=past	3.5079	1.1825	2.966	<0.01	**

**Table 11: The result of the model testing responses in the vertical-only condition across three groups, time type: future vs. past**

	ESTIMATE	STD. ERROR	Z VALUE	PR(> Z )	
(Intercept)	1.6154	0.4169	3.875	<0.001	***
language= English-monolingual	1.9577	0.6256	3.129	<0.01	**
language= Mandarin-bilingual	-1.1112	0.3351	-3.316	<0.001	***
language= Mandarin-monolingual	-1.1692	0.4612	-2.535	<0.05	*
time=typepast	-3.8654	0.5296	-7.299	<0.001	***
language= English-monolingual: time=typepast	-3.2831	0.796	-4.124	<0.001	***
language= Mandarin-bilingual: time=typepast	3.1716	0.5158	6.149	<0.001	***
language= Mandarin-monolingual: time=typepast	3.5202	0.5105	6.896	<0.001	***

**Table 12: The results of the model testing the interaction between time type and language for the participants' transverse responses in the transverse-only condition, time type: future vs. past**

	ESTIMATE	STD. ERROR	Z VALUE	PR(> Z )	
(Intercept)	0.50143	0.24198	2.072	<0.05	*
language= English-monolingual	1.7276	0.42471	4.068	<0.001	***
language= Mandarin-bilingual	-0.34991	0.27962	-1.251	0.2108	
language= Mandarin-monolingual	0.04285	0.33636	0.127	0.8986	
time=typepast	-1.33917	0.29109	-4.601	<0.001	***
language= English-monolingual: time=typepast	-3.22555	0.55017	-5.863	<0.001	***
language= Mandarin-bilingual:time= typepast	0.48003	0.40623	1.182	0.2373	
language= Mandarin-monolingual: time=typepast	0.48534	0.39944	1.215	0.2244	

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# REVIEW

Hendery, Rachel. 2015. *One man is an island: The speech community William Marsters begat on Palmerston Island*. UK: Battlebridge Publications.

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Rachel Hendery's *One man is an island: The speech community William Marsters begat on Palmerston Island* is the fifth in the *Islanders Series* from Battlebridge Publications. The book is 112 pages (including a very thorough index) and covers the history of the settlement of Palmerston Island, in the Cook Islands, by William Marsters, his family, and their descendants, as well as giving a brief description of Palmerston Island English.

Since 1860, Palmerston Island has been occupied by the descendants of William Marsters, an Englishman of uncertain origin, and his three Cook Islands Māori wives Akakaingara, Tepou Tinioi and Matavia. Due to its remote and inaccessible nature, Palmerston Island has always been very isolated, and as a result, an interesting linguistic landscape has evolved there. It is this linguistic situation that provides the inspiration for this book, as Hendery is the linguist who has contributed most of the scholarly work on Palmerston Island English to date. However, the work reviewed here is not technical, and would be of interest to the general reader.

The first chapter addresses the issue of how to get to and from Palmerston Island, which she describes as 'one of the more isolated places in the modern world' (Hendery 2015: 58), as well as describing it physically as it is today.

The next two chapters provide historical and contemporary descriptions of the settlement and continued occupation of the island by William Marsters and his descendants. From the reviewer's point of view, as a non-Palmerston Cook Islander, this history is pleasingly clear, and dispels many misapprehensions commonly held about the settlement of Palmerston Island. For a reader unfamiliar with the folk history of Palmerston Island, it presents an interesting and respectful account of the history and contemporary lives of the people of Palmerston. Hendery draws generously on descriptions from contemporaneous writings, both in English and Cook Islands Māori, which provide colourful illustrations of life on Palmerston throughout the years. She does not shy away from admitting that the precise details of these stories are probably not recoverable from the many varied accounts that are available. However, she provides good evidence for any claims she does make.

The final chapter, which reaches 40 pages, and constitutes nearly half of the book, focuses on Palmerston Island English as spoken by the people of Palmerston, and some of the Palmerston diaspora. The lack of technical language, for example the use of IPA, made this chapter a little unsatisfying for this reviewer as a linguist. However, this is not the target audience for this book, and the technical angle is available elsewhere (Hendery, 2012; Hendery, 2013; Hendery, 2015; Hendery, 2016; Hendery, Mühlhäusler, and Nash, 2015). Hendery wisely declines to make a claim on the question of *what kind of language* Palmerston Island English is, suggesting, rather, that it shows properties both of a dialect (of English), and of a creole, as well as enormous variation between speakers. In the context of discussing this question, she incidentally provides a nice, simple description of the nature of creole languages more generally.

Hendery provides a good overview of the socio-linguistic situation, as well as some phonological, grammatical and lexical features. Notably, she offers good evidence here to refute the widely promulgated claim that English has been the only language spoken on Palmerston Island, suggesting that for most of its history the people of Palmerston have been bilingual in Palmerston Island English and Cook Islands Māori. She dates the shift towards Palmerston Island English monolingualism to the mid twentieth century. The author also discusses the attitudes of Palmerston Island people to their language and their particular pride in their Englishness. This section offers some interesting insights into attitudes about “standard varieties” of English generally.

In the later part of the chapter Hendery discusses some of the phonetic and grammatical features of Palmerston Island English, and makes comments on



the likely origins of these features. The general trend here is that most of the notable features of Palmerston Island English are not likely to have originated from whichever variety of English William Marsters spoke, but, rather, from Cook Islands Māori, or other local Pacific Englishes, both historical (e.g. various nineteenth century “ship Englishes” and Pacific creoles) and contemporary varieties (e.g. New Zealand English, Cook Islands English, Samoan English). She suggests that the influence of whichever variety of English William Marsters spoke is limited to some vowel sounds, and some vocabulary. This claim is counter to the widely held folk linguistic belief of many Cook Islanders, that the people of Palmerston speak nineteenth century Gloucestershire English.

One small criticism: in the discussion of the vocabulary the author makes note of a few items that if she was more familiar with Cook Islands English or Cook Islands Māori she would not have found remarkable. However, the scholarship behind this work is generally sound, and Hendery has provided a very interesting and accessible history of this little known corner of the Realm of New Zealand, and the unique variety of English spoken by its people.

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## REVIEW

Moon, Paul. 2016. *Ka ngaro te reo. Māori language under siege in the nineteenth century*. Dunedin: Otago University Press.

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The latest book from prolific writer, New Zealand historian Paul Moon, *Ka ngaro te reo*, is a history of the Māori language covering the hundred years from 1800 to 1899. This century was undoubtedly the most momentous for the Māori people and their language. From previous intermittent contact with Europeans, the 1800s saw the arrival of missionaries, followed by European settlers, the development of a government, and widespread advances in infrastructure. Colonisation also brought with it concomitant deleterious effects for Māori, whose population declined to seriously low levels by the beginning of the 20th century. As for the Māori language, during the 19th century te reo acquired a written form, many new words and a Māori print culture developed and flourished for a time.

This formative period is often overlooked, thus a book about te reo in the 19th century is well overdue. Any description of the history of the language is of course tied up with the history of its speakers: what they were doing and what was happening around them. Accordingly, this book has an appropriate historical focus with Moon utilizing his skills to access a wide range of written material, including newspapers as well as church and government papers. But,

tellingly, the book contains very little material from a linguistic standpoint. This means that not all relevant information is included and that analyses are bereft of linguistic theory.

Chapter one begins with a description of a modern day tangihanga, with the ritual's powerful links to generations of ancestors, a powerful connection between the present and the past. The chapter then moves on to describe aspects of Māori language and culture in the year 1800. As well as giving details of tribal structure and the significance of whakapapa, Moon stresses the importance of the oral word along with the literary aspects of te reo Māori (oratory, song, fable). Chapter two covers up to 1814 and the arrival of missionary Samuel Marsden. During this period the main contact with Europeans was through interactions with whalers and sealers and early explorers.

Chapter three covers up to the mid 1830s and focusses on the work of the missionaries and their efforts to devise an alphabet for the Māori language as part of their aim of translating the Bible. While the important work of Kendall and others is given some prominence, there is no discussion of the fascinating details of the development of the alphabet for the Māori language in the late 1820s as ably outlined by Parkinson (2016). The biggest debate in the formation of the orthography for te reo was the comparatively late inclusion of <wh> in 1841. This is not mentioned at all, although Maclagan and King (2002) provide a good account of the reasons for the late acceptance of this phoneme into the Māori alphabet. In contrast, Moon makes much of the effect of the standardisation of the Māori language on dialect pronunciations, for example, citing contemporary sources regarding a now lost variant pronunciation of <h> in Northland (pp. 97–99). Moon posits that the formulation of a standard alphabet can have negative repercussions on dialectal pronunciations, but the evidence is necessarily speculative and not supported by an example in the Māori language itself, the fact that the various pronunciations of <wh> in the 19th century have coalesced to /f/ amongst modern speakers, an outcome not predicable by the orthography (see Maclagan and King 2002).

Easily the biggest change te reo underwent during early colonisation was its transformation into a written language, a process Moon suggests “reconfigured elements of Māori language and culture” (p.12). However, from a wider perspective, the presence of a reasonably uncontested orthography and written standard has been an underappreciated boon to the revitalization of the language. There are many endangered languages where a written form is either

non-existent or contested, situations which drain much productive energy in a revitalization context.

Chapter four covers up to the mid-point of the century from the Treaty of Waitangi through to the publication of the first (government) newspaper in Māori in 1842 and the arrival of European settlers. Here there is a discussion about the formation of neologisms in Māori as a response to the many new aspects of Pākehā culture. Moon focusses wholly on the role of missionaries in their coining of new words in their translation of the Bible (p. 110-111) and neglects work describing the role Māori themselves played in this process (see Harlow 2004 for a good description). The effect of *te reo* on New Zealand English through the borrowing of Māori words (see Macalister 2006) is peremptorily dismissed: “English had little need to borrow from *te reo*” (p. 110), whereas most scholars agree that “the most distinctive feature of New Zealand English is the presence of words of Maori origin” (Macalister 2006, p. 1).

The formation of the first government in the 1850s opens chapter five which covers the period up to the 1860s. This is the era of Governor Grey who had a strong interest in Māori culture, but from a perspective where the culture was “regarded as something belonging to the past” (p. 149). One of the strengths of the book is the numerous examples of the unyielding dominant narrative of the European towards Māori, “the embedded mentality of cultural superiority” (p. 67) in which the Māori language was seen as a barrier to successful completion of the colonial agenda. However, this strength with Pākehā sources also belies another major weakness: there are very few Māori sources cited so we do not get to appreciate Māori perspectives of *te reo*. While Moon mentions the burgeoning use of writing by Māori who were “constantly sending letters” (p. 109) there is no in depth description of the tens of thousands of letters written by Māori to government officials (particularly Land Purchase Officer Donald McLean) in the second half of the 19th century. These letters, and many others, are held in archives throughout the country. This written material, ranging in subject from land issues to mythology and poetry, has wider significance as arguably the largest body of writing which survives from an indigenous colonised people produced within a generation of European contact (Orbell 1995, pp. 19 & 21).

With regard to Māori writing, a particularly accessible publication is John Caselberg’s collection of translations of 19th century writings by Māori (1975) which includes Māori perspectives of missionaries, the Treaty debates

and the New Zealand Wars. By overlooking such material Moon's book loses an excellent opportunity to include discussion of the use of the Māori language in political discourse, the epitome of which were arguably Renata Tamakihikurangi's 1861 letters about the wars (Caselberg 1975, pp. 82–97) which have been expertly analysed by Head (2001).

In chapter six, which covers the 1870s to the 1890s there is much useful material covering both the social Darwinism expressed by Pākehā of the era, which existed alongside the romanticism of the “Māoriland” of Pākehā writers. It was also this period which saw the passing of the Native Schools Act (1876), where government funding was only to be supplied for schools where English was the medium of instruction. Thus, the era of the Māori language mission schools came to an end.

Turning to the end of the 19th century the book concludes with a chapter covering the year 1899 and the summation of Moon's thesis and the idea proposed in the book's title that the Māori language was under siege. His reasoning is that “given the dire condition of the Māori population by the 1890s, it is hardly surprising that this was when te reo reached its nadir” (p. 13). Moon assumes that because Māori themselves were deemed to be dying out then their language must also have been dying. While he provides much evidence that this was the Pākehā viewpoint of the time few Māori sources are cited. While it is uncontroversial to say that the 19th century colonisation of Aotearoa initiated the processes that would eventually lead to te reo becoming an endangered language in the 20th century, in 1899 the Māori language was still spoken in predominantly Māori communities where all but a few Māori still resided. That is, the domains present in 1800 were in 1899 still strongly associated with speaking Māori: the home, the community and important marae ritual. And during the course of the century te reo had extended its scope into the written form, and had flirted with a print culture. To be sure, the additional domains now present in the wider environment: education, business and government which were initially Māori were strongly English by the end of the 19th century. English certainly had the power of status which would ultimately be the motivator for language shift in the 20th century. But that shift was not present at the end of the 19th century. It had yet to come. So while Māori themselves may have felt under siege at this time it does not follow that the language was too.

The literature on language endangerment tells us that while absolute numbers of speakers can be an important indicator of the health of a language, it is the existence of intergenerational language transmission which is the key

indicator (Fishman 1991). Moon himself cites Inspector of Schools that at the beginning of the 20th century saying that “te reo was still the mother tongue of practically all Māori children” (p. 198). Benton’s work (1991) shows that the shift away from raising Māori children as speakers of Māori really only began around World War One and that the nadir of te reo was actually in the 1970s when there were only two communities which were raising children as speakers of te reo.

Instead of *Ka ngaro te reo* (the language disappears) an alternative title might be *Ka ora te reo* (the language lives). For the information contained in Moon’s book is capable of such a reading. Moon himself contends that the present day tangihanga described in the opening pages is very similar to those conducted 200 years ago, the main difference being that the language differs greatly in the “context in which it was nestled” (p. 17). In many ways this book describes the resilience of the Māori language in the 19th century.

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# THE EDITOR'S NOTICEBOARD

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I'm very happy to bring you volume 60 of Te Reo. It will be my last as Editor; I will hand over the role to Dr Andreea Calude (University of Waikato). I'm pleased to be able to pass over the journal when it is finally running on schedule, and I hope the fact that there is no longer a backlog will encourage you to consider Te Reo as a venue for your new papers. I'd like to thank everyone who has submitted a paper to the journal over the last three years, and five volumes, and also the many reviewers. I have been honoured to serve the New Zealand Linguistics community in this small way, and I thank Andreea for agreeing to take over the reins. Te Reo will be in safe hands.

