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Abstract

Katoa, approximately translated as ‘all, every’, functions as the universal quantifier in te reo Māori (the Māori language), inherited from Proto Polynesian *katoa. Less well known is its occurrence as a postnominal modifier in singular noun phrases, contributing the meaning of ‘whole’, and as a nominal head meaning ‘all (of them), the whole (of it)’. As a postverbal modifier, *katoa* can quantify a subject noun phrase with the same meanings of ‘all, every’ and ‘whole’, and it can modify situations expressed by the verb, meaning ‘wholly, completely’. In this paper, we examine the behaviour of *katoa* in te reo Māori, comparing some properties of *katoa* with the behaviour of quantifiers in related Polynesian languages. This, in turn, informs our understanding of the prehistory of quantification in Polynesian, where we observe evidence of both retention and replacement of quantifier forms.

Keywords

Te reo Māori, Polynesian, universal quantification, morphosyntactic alignment, quantifier float, discontinuous quantification

1 Introduction

Te reo Māori, the Indigenous language of Aotearoa New Zealand, is a member of the Polynesian branch of Oceanic, which itself belongs to the Austronesian language family, as shown in (1).

1. Austronesian > Malayo-Polynesian > Central/Eastern Malayo-Polynesian > Eastern Malayo-Polynesian > Oceanic > Central Pacific > Eastern/Central Pacific linkage > Polynesian¹

In this paper, quantification in te reo Māori is examined, with a focus on the universal quantifier *katoa* ‘all, every’. The paper presents a descriptive account of the behaviour of *katoa*, and a comparative survey of universal quantifiers in related Polynesian languages, allowing for hypotheses to be developed about the forms and functions of quantification in prehistory.

Linguistic elements like *katoa* ‘all, every’ are described as *universal quantifiers*, where universal quantifiers form “expressions referring to an exhaustive amount or number of the quantified expression” (Gil 2008: 1276). *Katoa* is formally identified as a quantifier in accordance with Gil’s (2008: 1290) delimitation of a quantifier as being “free standing – a word or phrase, rather than an affix or some other bound morphological unit”. The free-standing property of *katoa* is illustrated in (2). Semantically, Gil (2008: 1291) delimits quantifiers as those elements whose “meaning must involve the notion of quantity”, although he recognises that “quantificational meanings may shade off gradually into other kinds of meanings not generally considered to be quantificational”. Again, data in (2) show how *katoa* contributes the quantificational meaning ‘all’.

2.	Te reo Māori	English
	<i>rātou</i>	‘3PL, they, them’ ²
	<i>rātou katoa</i>	‘they all, all of them’
	<i>ngā rākau</i>	‘the trees’
	<i>ngā rākau katoa</i>	‘all of the trees’
	<i>ngā rākau nui katoa</i>	‘all of the big trees’, also ‘all of the biggest trees’

Katoa is of relevance to language learners and linguists alike because it can modify nouns from within the noun phrase, and also from the verb complex.³ Such patterning has been described as ‘quantifier float’ in grammatical accounts of te reo Māori (Bauer et al. 2003: 290), and in the literature on other Polynesian languages (see e.g. Chung (1978) on Samoan and Tongan; Seiter (1979) on Niuean; Besnier (2000) on Tuvaluan). The term ‘quantifier float’ derives from formal approaches to syntax, where languages are assumed to have a single underlying constituent order, and variations on that order are treated as ‘movements’.

Rather than appealing to formal syntax in our study of *katoa*, we follow Gil’s (2008: 2080) comparative approach to quantification, in distinguishing between *continuous* and *discontinuous* quantification. Continuous quantification involves the quantified element and

¹ The position of the Oceanic languages within Austronesian is attributed to Blust (most recently 2014); the position of Polynesian within Oceanic is attributed to Ross et al. (most recently 2016: 10).

² Glossing of data follows the Leipzig Glossing Rules; non-Leipzig glosses include: AG ‘agent’, AE ‘actor-emphatic’, EMPH ‘emphatic particle’, EXH ‘exhortative’, GENR ‘general tense-aspect-mood’, NMLZ ‘nominalizer’, NSP ‘nonspecific article’, NTR ‘neutral aspect’, PRS ‘personal article’, PURP ‘purpose’, RELT ‘relative tense’, SP ‘specific’. All glossing is informed by language specific analyses; in places we have regularised glosses across languages, for ease of comparability. As per linguistic convention, an asterisk before a construction signals that it is ungrammatical in Section 2; in Section 3, the asterisk before a word indicates a reconstructed ancestral word form.

³ The term ‘verb complex’ (see e.g. Evans 2003: 10–11) is applied to the structural unit containing a verb as its lexical head, along with pre- and postverbal modifiers. Core arguments are positioned outside of the verb complex, although in many Oceanic languages, core arguments are also indexed within the verb complex.

the quantifier forming a single constituent, as in the combination of noun and quantifier within a noun phrase. Discontinuous quantification involves the quantified element and the quantifier occurring in two different constituents, as in the placement of a quantifier within a verb complex, quantifying a nominal within a noun phrase.⁴

A grammatical account of discontinuous quantification is necessarily concerned with the noun phrase types that can be quantified. We appeal to terms from the study of morphosyntactic alignment (see e.g. Payne 2006; Haspelmath 2011), identifying the following noun phrase types:

- | | | |
|----|----------------|--|
| 3. | S-function | the single argument in a clause with an intransitive verb |
| | A-function | the argument that is most agent-like in a clause with a prototypical transitive verb |
| | O-function | the argument that is most patient-like in a clause with a prototypical transitive verb (this is also referred to as P rather than O) |
| | PrepO-function | the object of a preposition (typically a noncore argument of a clause) |

In languages where A-function nominals are treated in the same way as S-function nominals, the system is described as NOMINATIVE-ACCUSATIVE, where nominative refers to the S/A category; in languages where O-function nominals are treated in the same way as S-function nominals, the system is described as ERGATIVE-ABSOLUTIVE, where absolutive refers to the S/O category. Different parts of a linguistic system may align in different ways, or may show NEUTRAL alignment, with S, A, and O behaving in the same way (Haspelmath 2011: 541).

Returning to the description of *katoa*, a cursory glance at pedagogic materials for teachers and learners of te reo Māori indicates that very little attention is paid to *katoa*. If included, *katoa* is listed alongside manner modifiers of the verb that take passive morphology (e.g. Moorfield 2001: 91–92). The starting point for our examination of *katoa* therefore involves exploring the behaviour of *katoa* as reported in grammatical works on te reo Māori. Chief among these is Bauer et al.’s (2003) grammar, which contains an account of the behaviour of *katoa* (Bauer et al. 2003: 290–292), as well as numerous example sentences which include *katoa*. Harlow’s (2015) grammar of Māori contains similar information, although it is somewhat briefer.⁵

We expand our observations of *katoa* with reference to comparative/typological works on quantification. Gil’s (2008) comparative description of quantification presents key distinctions identified by researchers in the study of quantification, along with associated terminology. Keenan’s (2017) guiding chapter “The quantifier questionnaire” has sections on universal quantification, as well as on quantifier float, both of which are directly relevant to the study of *katoa* in te reo Māori. Gil (2008) and Keenan (2017) prompt questions to consider the behaviour of *katoa* in relation to the behaviour of quantifiers in other languages of the world. Some of these questions are addressed by published data; others are addressed

⁴ Gil (2008: 1280–1281) notes that while “some analyses of discontinuous quantification consider the quantifier to have undergone “movement” or to have “floated” away from its proper place”, “it should be noted that constructions such as these are cross-linguistically widespread, providing the unmarked strategy for the expression of quantification in many languages; accordingly, their distribution provides no support for their characterization as derivative in any sense”.

⁵ Appendix I provides our suggestions of points where grammatical information about *katoa* could be introduced to a Māori language classroom, as well as suggestions of grammatical topics that could be illustrated with data concerning *katoa* in a linguistics classroom.

by data generated for the project by authors Kanaueha Wessels and Beau Stowers, both of whom are first-language speakers of te reo Māori, and graduates of Kura Kaupapa Māori, Māori-medium education.⁶ Our observations of the behaviour of *katoa* are presented in Section 2.

Secondly, we consider the behaviour of *katoa* in relation to the behaviour of formally and/or functionally related quantifiers in a selection of Polynesian languages of the Oceanic branch of the Austronesian language family. These include some of te reo Māori's closest genetic relatives, Cook Islands Māori⁷ (Nicholas 2016), and Rapa Nui (De Feu 1996; Kieviet 2017) from East Polynesian; and languages further afield, including Samoan (Chung 1978; Milner 1978; Mosel & Hovdhaugen 1992) and Tuvaluan (Besnier 2000), from the Samoic-Outlier group; Tongan (Churchwood 1953; 1959; Chung 1978), and Niuean (Seiter 1979; Sperlich 1997; Massam 2020) from the Tongic group, and Pukapukan (Salisbury 2002) and Tikopian (Early 1981; Firth 1985) from the Futunic group. Collectively, these languages shed light on formal and functional expressions of universal quantification in Polynesian, presented in Section 3.

We conclude the paper with a summary of our main findings, and our observations of diachronic changes that have affected the form and functions of the universal quantifier in Polynesian in Section 4.

2 Katoa

In this section, the behaviour of *katoa* in te reo Māori is explored. Structures in which *katoa* is positioned as a continuous quantifier are presented in §2.1, along with observations about the use of *katoa* as a nominal head. Structures in which *katoa* is positioned as a discontinuous quantifier are presented in §2.2.

2.1 *Katoa in the noun phrase*

Katoa functions as a continuous nominal quantifier in te reo Māori, occurring postnominally, and modifying both pronouns and nouns (Bauer et al. 2003: 290–292; Harlow 2015: 40–41), as shown in (2) above. *Katoa* can occur in structures like the ubiquitous greetings *tēnā koutou katoa* and *tēnā tātou katoa*. In this grammatical context, modifying a plural nominal (or pronominal), it translates as ‘all, every’. This function of *katoa* is most clearly described by Bauer et al. (2003), and it is captured by the translation of *katoa* in *Te Aka Māori Dictionary* (Moorfield n.d.: *katoa*) as ‘all, every’, where it refers to all members of a set, where the set contains more than one member. The other context in which *katoa* occurs is after a singular

⁶ In generating examples for this project, Kanaueha and Beau (as speakers of te reo Māori) engaged in a process that Julie and Kanaueha have both employed in their linguistic field research with speakers of Vanuatu languages. Rather than relying on the intuitions of a single speaker, Julie and Kanaueha have developed a practice of working with at least two speakers together, whenever possible. An important part of this process is for one speaker to hear and evaluate examples being produced by a second speaker. This process allows speakers to share and discuss their ideas about structures and meanings, and the resulting analysis is more robust, having been verified collaboratively by speakers, rather than simply extracted from data by a linguist. Through this process, we identified and discussed several problematic examples, and were able to tease apart distinctions in meaning together, allowing for a clearer analysis to be presented. Having said this, we acknowledge that te reo Māori is spoken in different ways by different people. Some speakers may find examples included in the paper to be problematic, or open to alternative interpretations, based on their own knowledge and understandings.

⁷ Cook Islands Māori is more commonly known simply as Māori to the people of the Cook Islands, although in the linguistic literature, the language has been referred to as Rarotongan (see e.g. Lynch et al. 2002), following the toponym of the largest island in the Cook Islands group.

nominal, where it translates as ‘whole, complete’. In this context, *katoa* refers to a set of just one member. Although translated in different ways, *katoa* in te reo Māori can be understood as a universal quantifier that refers to the entirety of a set, whether that set contains many items, or just one.

2.1.1 Katoa as a postnominal modifier

Katoa combines productively with a range of semantic types of nominals. Pairs of singular and plural nouns, coded as such with singular and plural articles and possessors, are illustrated with *katoa* below.

4.	human:	<i>te tangata katoa</i> <i>ngā rūruhi katoa</i>	‘the whole person’ ‘all the old women’
	animate nonhuman:	<i>te poaka katoa</i> <i>ngā poaka katoa</i>	‘the whole pig’ ‘all the pigs’
	inanimate bounded:	<i>te kōhatu katoa</i> <i>ngā kōhatu katoa</i>	‘the whole stone’ ‘all the stones’
	abstract cognition:	<i>tōku maharatanga katoa</i> <i>ōku whakaaro katoa</i> <i>aku moemoeā katoa</i>	‘my whole memory’ ‘all my thoughts’ ‘all my dreams’
	abstract emotion:	<i>tōku aroha katoa</i> <i>aku kare ā-roto katoa</i>	‘all my love/sympathy’ ‘all my sorrows/emotions’

Nominalisations that express events, with duration or internal structure, can be conceived of as ‘whole’ and can be counted. Such nominalisations may be modified with *katoa*.

5.	(a)	<i>tangihanga (tangi)</i> <i>te tangihanga katoa</i> <i>ngā tangihanga katoa</i>	‘funeral (cry, mourn)’ ‘the entire funeral (including events on different days)’ ‘all (the) funerals’
	(b)	<i>haerenga (haere)</i> <i>te haerenga katoa</i> <i>ngā haerenga katoa</i>	‘journey (move/go)’ ‘the entire journey’ ‘all (the) journeys’
	(c)	<i>hurihanga (huri)</i> <i>i te hurihanga katoa</i> <i>i ngā hurihanga katoa</i>	‘turning (turn)’ ‘in the whole rotation’ ‘in all the rotations’
	(d)	<i>tirohanga (titiro)</i> <i>ko taku tirohanga katoa...</i> <i>ko ngā tirohanga katoa ā</i> <i>ngā tūpuna...</i>	‘looking (look)’ ‘in my whole perspective...’ ‘in all the perspectives of the ancestors...’

(e)	<i>ekenga (eke)</i> <i>te ekenga katoa</i> <i>ana ekenga katoa</i>	‘boarding, ascent (board)’ ‘the whole achievement’ ‘all of their (his/her) achievements’
(f)	<i>mātauranga (mātau)</i> <i>te mātauranga katoa</i> ⁸ <i>ō mātauranga katoa</i>	‘knowledge, understanding (know, understand)’ ‘all the knowledge (e.g. on different topics)’ ‘all your knowledge (e.g. on different topics)’
(g)	<i>huihuinga (hui)</i> <i>te huihuinga katoa</i> <i>ngā huihuinga katoa</i>	‘gathering (gather, meet)’ ‘the whole gathering’ ‘all the gatherings’
(h)	<i>manaakitanga (manaaki)</i> <i>te manaakitanga katoa</i> <i>ngā manaakitanga katoa</i> ⁹	‘hospitality, kindness, generosity (take care of, give hospitality to)’ ‘the entirety of the hospitality (in all its acts)’ ‘all of the kindnesses’

It is noteworthy that some nominalisations have more than one meaning, and that some roots can be nominalised by different suffixes, at times producing different meanings. The examples offered below may be of particular interest to language learners.

Moenga can be modified by *katoa* in both its meanings – ‘bed’ and ‘marriage’ (from the verb *moe* ‘sleep’ or ‘marry, sleep with’):

6.	<i>moe</i>	1. ‘sleep’	2. ‘marry, sleep with’
	<i>moenga</i>	1. ‘bed (sleep)’	2. ‘marriage (marry, sleep with)’
	<i>te moenga katoa</i>	1. ‘the whole bed’	2. ‘the whole marriage’
	<i>ngā moenga katoa</i>	1. ‘all the beds’	2. ‘all the marriages’

The verb *ako* ‘learn, study, teach’ can be nominalised in at least three different ways, and each nominalisation can be modified by *katoa* in both singular and plural noun phrases.^{10,11}

7.	<i>ako</i> ‘learn, study, teach’	
(a)	<i>akoranga</i>	‘lesson’
	<i>te akoranga katoa</i>	‘the whole lesson’
	<i>ngā akoranga katoa</i>	‘all the lessons’

⁸ For example, one might say: *Ko te mātauranga katoa mō tēnei kaupapa nāna i tuhi.* ‘All the knowledge about this topic, he/she wrote’.

⁹ For example, one might say: *Ngā manaakitanga katoa o te Atua ki runga i a koe.* ‘May all of God’s kindness be upon you.’

¹⁰ While not all speakers of te reo Māori may distinguish clearly between the meanings of *akoranga* ‘lesson’, and *akomanga* ‘class, classroom’ (referring to the physical space), this is an important distinction for Kanaueha and Beau as speakers and teachers of te reo Māori. A reviewer also pointed out that the form *akotanga* is attested. We agree, although for us, this nominalised form is rarer, and we would use it for ‘the learning of’, for example, *Ko te akotanga o te reo Māori he mahi mutunga kore* meaning ‘The learning of te reo Māori is a never-ending process.’

¹¹ An irregular process of vowel lengthening applies in the nominalisation of *ako* to *ākonga*. The antepenultimate /a/ is lengthened in a parallel process to the vowel lengthening of some human nouns (cf. Bauer et al. 2003: 160; Harlow 2015: 18–19).

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| (b) | <i>akomanga</i>
<i>tēnei akomanga katoa</i>
<i>ērā akomanga katoa</i> | ‘class, classroom’
‘this whole classroom’
‘all those classrooms’ |
| (c) | <i>ākonga</i>
<i>he painga mō te ākonga katoa</i>
<i>āku ākonga katoa</i> | ‘student’ (note the initial lengthened vowel)
‘for the wellbeing of the whole student (e.g. mental, physical, spiritual)’
‘all of my students’ |

Kotahi ‘be one, be united’ can be nominalised as *kotahitanga* ‘unity, solidarity’. In this form, it is marginal when modified as *?te kotahitanga katoa*. This is likely to be a semantic restriction, since ‘unity, solidarity’ already expresses the meaning of ‘whole’. It appears to be acceptable in some contexts, however, for example: *ko te kotahitanga katoa o ngā iwi o Niu Tīreni* meaning ‘the complete oneness of all people of New Zealand’.

2.1.2 Katoa ‘all, every’ and prenominal modifiers

Katoa occurs in combination with a range of prenominal articles and demonstratives, in their plural form, contributing the meaning ‘all, every’. These include *ngā* ‘the, plural definite article’, *ēnei* ‘these, plural demonstrative, proximity to speaker’, *ēnā* ‘those, plural demonstrative, proximity to hearer’, *ērā* ‘those, plural distal demonstrative’, and *aua* ‘the aforementioned, plural anaphoric demonstrative’.

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|----|---|---|
| 8. | <i>ngā tāngata katoa</i>
<i>ēnei tāngata katoa</i>
<i>ēnā tāngata katoa</i>
<i>ērā tāngata katoa</i>
<i>aua tāngata katoa</i> | ‘all the people, everyone’
‘all these people (near speaker)’
‘all those people (near hearer)’
‘all those people’
‘all of those aforementioned people’ |
|----|---|---|

Katoa also combines successfully with plural possessums, illustrated with the first person singular possessor forms for plural possessums in (9a), and the first person plural exclusive possessor forms for plural possessums in (9b). Examples of O class, A class and neutral possessor forms are presented.

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|----|---|---|
| 9. | (a) <i>ōku whakaaro katoa</i>
<i>āku pukapuka katoa</i>
<i>aku mahi katoa</i> | ‘all my thoughts’
‘all my books’
‘all my work’ |
| | (b) <i>ō mātou whakaaro katoa</i>
<i>ā mātou pukapuka katoa</i>
<i>ā mātou mahi katoa</i> | ‘all our thoughts’
‘all our books’
‘all our work’ |

Katoa ‘all, every’ is generally semantically incompatible with *ētahi* ‘some’. Where *katoa* specifies all members of a group, *ētahi* specifies a subset of those group members. Noun phrases such as **ētahi tāngata katoa* are therefore ungrammatical without further context. Similarly, *katoa* is generally incompatible with the interrogative *ēhea* ‘which’.¹²

¹² The following construction is acceptable: *Nāna ētahi whenua katoa i homai ki taku iwi*. ‘They gave my people some land.’ This example conveys the idea that it is not just ‘some’ land, but that a significant amount of land was exchanged. Regarding *ēhea*, if in conversation, a speaker refers to *ngā tāngata katoa* ‘all the people’, and

Katoa is also semantically incompatible with noun phrases introduced by *ia*, to express the notion of *each/every* and *mea* to mean ‘such-and-such’. These phrases point to specific individual entities, incompatible with the universal notion ‘all’. The phrase *ki ia iwi, ki ia iwi o tātou* ‘to each tribe of us’ (from Harlow 2015: 67) indicates individuated tribes within a larger group of people, and *ia iwi* is incompatible with *katoa*. The phrase *ki mea wāhi* ‘to such-and-such a place’ (from Harlow 2015: 67) indicates a specific but nonidentified place and is incompatible with *katoa*.

2.1.3 *Katoa* ‘whole, complete’ and pronominal modifiers

When noun phrases are introduced by the singular definite article *te* ‘the’, *katoa* has the meaning ‘whole, complete’, referring to the entirety of the singular entity. Singular demonstratives are also compatible with *katoa* in its sense of ‘whole’.

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|-----|-----|---------------------------|---------------------------|
| 10. | (a) | <i>te ao katoa</i> | ‘the whole world’ |
| | | <i>te whare katoa</i> | ‘the whole house’ |
| | (b) | <i>tēnei mea katoa</i> | ‘this whole thing’ |
| | | <i>tēnā wāhanga katoa</i> | ‘that whole part/section’ |
| | | <i>tērā rōpū katoa</i> | ‘that whole group’ |
| | | <i>taua wāhi katoa</i> | ‘that whole area’ |

Possessors of singular possessums co-occur with *katoa*, where the sense of ‘whole’ applies.

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|-----|-----|-----------------------------|---|
| 11. | (a) | <i>tōku whare katoa</i> | ‘my whole house’ |
| | | <i>tāku pēke katoa</i> | ‘my whole bag’ |
| | | <i>taku katoa</i> | ‘my all (e.g. all of my energy, attention, love)’ |
| | (b) | <i>tō mātou whare katoa</i> | ‘our whole house’ |
| | | <i>tā mātou pēke katoa</i> | ‘our whole bag’ |
| | | <i>tō mātou katoa</i> | ‘our all (e.g. all of our energy, attention, love)’ |

A noun phrase beginning with the nonspecific determiner *he* ‘a, some’ can be modified by *katoa* in its sense of ‘whole’, rather than ‘all’. Here, *katoa* emphasises that the entirety of a building has been completed.

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|-----|-----|----------------------------|-----------|---------------------|
| 12. | (a) | <i>Kua hangā</i> | <i>he</i> | <i>whare.</i> |
| | | PRF build-PASS | NSP | house |
| | | ‘A house was built.’ | | |
| | (b) | <i>Kua hangā</i> | <i>he</i> | <i>whare katoa.</i> |
| | | PRF build.PASS | NSP | house all |
| | | ‘A whole house was built.’ | | |

As noted in §2.1.1, phrases with the plural forms *ētahi* ‘some’ and *ēhea* ‘which’ are generally incompatible with *katoa* ‘all’. The same restriction applies to the singular forms

the hearer is unclear about whom the speaker is referring to, it is possible to ask for clarification by saying *ēhea tāngata katoa?*

tētahi ‘one’ and *tēhea* ‘which one’. Noun phrases introduced by these determiners generally do not combine with *katoa* in its plural or singular meaning. Thus, **tētahi whare katoa* and **tēhea whare katoa* are ungrammatical (and cannot mean ‘one whole house’, and ‘which whole house’).

The noun ‘water’ is generally uncountable in English; in te reo Māori, it can be treated as both a substance and a bounded water-entity, such as a ‘drink’ or a ‘river’. An older person might say to a child *Inumia te wai katoa!* ‘Drink all the water!’, referring to a cup of water. In response to *Inumia te wai!* ‘Drink the water!’, a reluctant child might query, *Te wai katoa?* ‘All of the water?’

While plural pronouns combine with *katoa* in its meaning ‘all’ (recall *rātou katoa* ‘all of them’), singular and dual pronouns are incompatible with *katoa*. It is not possible to say **ahau katoa* with the meaning ‘all of me’ or ‘the whole of me’. It is also not possible to say **tāua katoa* or **māua katoa* (meaning ‘all two of us’ – this is also odd in English). Instead, a possessive expression is used to convey this idea, with singular possession shown in (13a) and dual possession shown in (13b).

13. (a) *tōku katoa* ‘my all’
 tōu katoa ‘your all’
 tōna katoa ‘his/her/their all’
- (b) *tō māua katoa* ‘our all (exclusive, dual)’
 tō tāua katoa ‘our all (inclusive, dual)’
 tō kōrua katoa ‘your all (dual)’
 tō rāua katoa ‘their all (dual)’

2.1.4 Katoa ‘the whole, all of them’ as a nominal head

While the primary function of *katoa* described in section §2.1 is as a nominal modifier, it is worth noting briefly that *katoa* can also function as a nominal head in the expression *te katoa* ‘the whole of it/all of it’. Interestingly, the expression **ngā katoa* meaning simply ‘all’ is ungrammatical, and instead, *te katoa* is able to be interpreted with a plural meaning, as in (14b). The structure in (14b) can be understood distributively, to mean that each child individually bought an icecream (not that they only bought one to share); however, *te katoa* refers to the children previously mentioned, and so has a plural interpretation. Using *katoa* in this way requires a preceding or contextually available referent to help the listener identify ‘the whole/all’ which is being referred to.¹³

14. (a) *I kai-nga te katoa.*
 PST eat-PASS the.SG all
 ‘It was all eaten/The whole of it was eaten.’
- (b) *I haere ngā tamariki ki ngā toa.*
 PST move the.PL children LOC the.PL shop
 I hoko te katoa i tētahi aihikiri.
 PST buy the.SG all OBJ a ice cream
 ‘The children went to the shops. They all bought an ice cream.’

¹³ At mealttime, context supplies the details of food and drink being consumed. A parent might simply instruct their child: *Inumia te katoa!* ‘Drink it all!’

Alternatively, the expression *te katoa* can be further modified with a prepositional phrase of the form ‘the whole of X’. This then provides two structures (as we find in English) for expressing the notion of ‘whole’: one with *katoa* as the head of the noun phrase; and the second with *katoa* as a modifier of another nominal head, as shown in (15).

15. *te katoa o tōku whare* ‘the whole of my house’
taku/tōku whare katoa ‘my whole house’
te katoa o tēnei mea ‘the whole of this thing’
tēnei mea katoa ‘this whole thing’

2.1.5 Distribution of noun phrases continuously modified by *katoa*

Noun phrases with *katoa* can occur in all noun phrase functions and positions without restriction. Examples in (16) show different noun phrase functions in active declarative clauses.

16. (a) S-function
Ā mīharo noa rātou katoa.
 and marvel just 3PL all
 ‘And they all just marvelled.’ (Foster & Foster 1987: 150)
- (b) A-function
Kei te āwhina i a ia ngā tamariki katoa
 PRS help OBJ PRS 3SG the.PL children all
o te tāone o Te Kao.
 of the.SG town of T.
 ‘All the children of the town of Te Kao are helping her.’ (Bauer et al. 2003: 55 [404])
- (c) O-function
E mātaki-taki ana ngā tamariki
 PROG gaze-DUP PROG the.PL children
i ngā mea katoa.
 OBJ the.PL thing all
 ‘The children are gazing around at everything.’ (Foster & Foster 1987: 151)
- (d) PrepO-function
Kei te tākaro ia me ngā taputapu katoa.
 PRS play 3SG with the.PL object all
 ‘He’s playing with all the toys.’

Katoa can also occur in noun phrases in *ko*-topic constructions, passives, and actor-emphatic [AE] clauses.

17. (a) *Ko*-topic
Ko te wairua katoa o Kura e hiahia ana
 TOP the.SG spirit all of K. PROG desire PROG
ki a ia.
 OBJ PRS 3SG
 ‘... Kura’s entire spirit desired him.’ (Bauer et al. 2003: 188 [1287, KH, 2])
- (b) Passive S-function Patient
I whakapaua e ia ngā kai katoa.
 PST consume-PASS PASS.AG 3SG the.PL food all
 ‘All the food was consumed by him/her.’
- (c) Passive PrepO-function/Agent
I kai-nga ngā āporo e rātou katoa.
 PST eat-PASS the.PL apple PASS.AG 3PL all
 ‘The apples were eaten by all of them.’
- (d) Actor-Emphatic Agent¹⁴
Nā rātou katoa te whare i whakatikatika.
 AE.PST 3PL all the.SG house PST prepare/tidy
 ‘All of them tidied up the house.’
- (e) Actor-Emphatic Patient
Nā rātou te whare katoa i whakatikatika.
 AE.PST 3PL the.SG house all PST prepare/tidy
 ‘They tidied up the whole house.’

As illustrated in (17), *katoa* can occur in topic clauses where the subject is positioned as the first constituent. Such clauses usually introduce their subjects with the particle *ko* (Harlow 2015: 174); however, when *katoa* modifies a fronted subject, it can optionally be positioned first (Harlow 2015: 175). *Katoa* fills the position that is otherwise occupied by the topic particle *ko*. This structure is considered to be a more advanced variant for language learners. The examples in (18) illustrate various positions of the pronominal expression *rātou katoa* ‘they all’, where *katoa* is distributed continuously.

18. (a) Active S-function with *N katoa*
I haere rātou katoa.
 PST move 3PL all
 ‘They all went.’
- (b) Fronted S-function with *Ko N katoa*
Ko rātou katoa i haere.
 TOP 3PL all PST move.
 ‘They all went.’

¹⁴ Bauer et al. (2003: 501) and Harlow (2015: 176–77) observe that the actor-emphatic construction most generally applies to active transitive situations. This means that means basic intransitive and passive clauses cannot be expressed in AE structures, and we cannot observe *katoa* with the sole core argument in these grammatical contexts.

- (c) Fronted S-function with *Katoa N*
Katoa *rātou i haere.*
 all 3PL PST move
 ‘They all went.’

Two further examples of topicalised noun phrases with fronted *katoa* are presented in (19), this time showing nominal rather than pronominal heads.

19. (a) ***Katoa*** *ngā tamariki i kata.*
 all the.PL children PST laugh
 ‘All the children laughed.’
- (b) ***Katoa*** *ngā ākonga i tae atu ki te hui.*
 all the.PL student PST arrive thither LOC the.SG meeting
 ‘All the students attended the meeting.’ (after Harlow 2015: 175)

2.2 *Katoa in the verb complex and the distribution of its semantic contribution*

Discontinuous quantification (or quantifier float) involves the placement of the quantifier *katoa* within the verb complex rather than within a noun phrase. From this position, *katoa* quantifies a nominal. Bauer et al. (2003: 290) describe *katoa* as quantifying only subject noun phrases. We consider this claim by examining the different types of subject noun phrases in te reo Māori that can be discontinuously quantified by *katoa*. Noun phrases that are discontinuously quantified by *katoa* appear to take the same form as noun phrases continuously quantified by *katoa*, and appear to follow the same co-occurrence restrictions identified for noun phrase modifiers (see §2.1.1).

Examples in (20) show the position and semantic contribution of *katoa* in an intransitive clause. In (20a), *katoa* occurs in postpronominal position; in (20b), *katoa* is within the verb complex, positioned postverbally (preceding the directional *mai*), but it contributes the same quantifying information ‘all’ about the pronominal. Example (20c) and (20d) show a singular nominal, and *katoa* positioned in the noun phrase and then in the verb complex. In these examples, *katoa* contributes the meaning ‘whole’ (although see §2.2.2 for an alternative interpretation¹⁵).

20. (a) *Kua tae mai rātou katoa.*
 PRF arrive hither 3PL all
 ‘They all have arrived.’
- (b) *Kua tae katoa mai rātou.*
 PRF arrive all hither 3PL
 ‘They have all arrived.’ (Harlow 2015: 41)

¹⁵ When *katoa* occurs as a postverbal modifier, particularly with a singular S-function noun phrase, the interpretation is ambiguous between modification of the whole situation or event as in ‘wholly, completely’, and modification of the S-function noun phrase as in ‘the whole NOUN’ (see §2.2.2. for further examples and discussion).

(c) *Pirau te āporo katoa.*
rotten the.SG apple all
'The whole apple is rotten.'

(d) *Pirau katoa te āporo.*
rotten all the.SG apple
'The apple is all rotten.'

2.2.1 Discontinuous *katoa* and the functions of associated noun phrases

In §2.1.5, we established that noun phrases with continuous *katoa* can occur freely in different structural positions in a range of sentence types. In contrast, discontinuous *katoa* is restricted to the quantification of the subject (Bauer et al. 2003: 290; Harlow 2015: 41), this being S-function and A-function noun phrases. Examples in (21) show discontinuous quantification of S-function nominals.

21. (a) *I haere katoa mai*
PST move all hither
'They all came.'

(b) *Ka puta katoa ki waho ngā tāngata o te*
TA appear all LOC outside the.PL men of the.SG
pā ki te tahu-kai.
pa PURP cook-food
'All the people of the pa came outside to cook food.' (Bauer et al. 2003: 55 [405, H, 10])

In a transitive clause, with two core arguments, discontinuous *katoa* always modifies the transitive subject (the A-function argument), as shown in (22).

22. (a) *I kite katoa rātou i a rātou.*
PST see all 3PL OBJ PRS 3PL
'They all saw them.'

(b) *Ki a Hōri, me ako katoa ngā tamariki kura*
LOC PRS H. should learn all the.PL children school
i te reo Hapanihi.
OBJ the.SG language Japan
'According to Hōri/In Hōri's opinion, all school children should learn Japanese.' (Harlow 2015: 153)

Katoa can occur in the verb complex of *ko*-topic constructions, modifying the topicalised subject:¹⁶

¹⁶ Similarly, continuous quantification in the structure: *ko ngā tamariki katoa ka kai i te aihikirimi* 'all the children will eat the ice cream' can be expressed discontinuously as: *ko ngā tamariki ka kai katoa i te aihikirimi*.

23. (a) *Ko ngā tamariki ka haere katoa ki te one.*
 TOP the.PL children TA move all LOC the.SG beach
 ‘All the children went to the beach.’ (Bauer et al. 2003: 291 [1909b])
- (b) *Ko ngā tamariki ka kauhoe katoa ki te awa.*
 TOP the.PL children TA swim all LOC the.SG river
 ‘All the children swam in the river.’
- (c) *I mate katoa rātou?*
 PST die all 3PL
 ‘Did everyone die?’
- Ae, katoa rātou i mate.*
 yes all 3PL PST die
 ‘Yes, they all died.’

Due to the S/A subject restriction on discontinuous quantification, O-function NPs cannot be quantified from the verb complex. In active clauses, *katoa* must occur as a postmodifier of an O-function nominal, as in (24a). In passive clauses, the active O-function becomes the sole S-function argument. Continuous quantification is shown in (24b), and discontinuous quantification is shown in (24c). *Katoa* must agree with the main verb in passive constructions, carrying the passive suffix *-tia*.¹⁷

24. (a) *Kua kai mātou i ngā āporo katoa.*
 PRF eat 1PL.EXCL OBJ the.PL apple all
 ‘We’ve eaten all the apples.’
- (b) *Kua kai-nga ngā āporo katoa.*
 PRF eat-PASS the.PL apple all
 ‘All the apples have been eaten.’
- (c) *Kua kai-nga katoa-tia ngā āporo.*
 PRF eat-PASS all-PASS the.PL apple
 ‘The apples have all been eaten.’ (Moorfield 2001: 92)

Additional examples of discontinuous quantification in passive clauses are given in (25).

25. (a) *Kua poke-a katoa-tia tātou.*
 PRF affect-PASS all-PASS 1PL.INCL
 ‘We are all affected.’ (Bauer et al. 2003: 488 [3142, PP2, 48])
- (b) *I whakapaua katoa-tia e ia ngā kai.*
 PST consume-PASS all-PASS PASS.AG 3SG the.PL food
 ‘The food was all consumed by him/her.’

¹⁷ *Katoa* is among a small set of postverbal modifiers that must agree with passive verb forms, carrying the suffix *-tia* (Bauer et al. 2003: 487; Harlow 2015: 168). In addition to *katoa*, these modifiers include the following manner particles: *tonu*, *rawa*, *kē*, *noa*, and *kau*.

Bauer et al. (2003: 559–560) observe that subjects can be omitted from clauses when they are identical to a preceding argument in discourse, or otherwise ‘deducible from context’. There are examples of third person plural patients in passive constructions which are omitted, leaving only discontinuous *katoa-tia* to signal that the passive subject (S-function argument) is ‘all’. In (26a), we have generated a context for which (26b), reported by Bauer et al. (2003) is possible.

26. (a) *I kite te iwi i te hoariri*
 PST see the.SG tribe OBJ the.SG enemy
e whakaeke mai ana.
 PROG invade hither PROG
 ‘The people saw the enemy coming closer.’
- (b) *Ka patu-a katoa-tia.*
 TA kill-PASS all-PASS
 ‘All the people were killed.’ (Bauer et al. 2003: 70 [507, TWh, 24])

2.2.2 Continuous *katoa* in the verb complex and in nonverbal predicates

In the previous section, *katoa* was shown to discontinuously modify S-/A-function heads from a postverbal position. Also in that position, *katoa* can function as a continuous verb modifier, providing detail about the situation expressed by the verb. This function relates to the second set of meanings of *katoa* given in *Te Aka Māori Dictionary* (Moorfield n.d.), namely ‘totally, wholly, completely’. Examples in (27) show stative verbs modified by *katoa* where the meaning of ‘completely, wholly’ is added, in these examples most naturally translated as ‘really’. In each case, a singular S-function nominal occurs in the clause.

27. (a) *Ngenge katoa ahau.*
 tired all 1SG
 ‘I’m really tired.’
- (b) *Makariri katoa te rangi.*
 cold all the.SG day
 ‘The day is really cold. (It’s cold.)’
- (c) *Wera katoa te onepū.*
 hot all the.SG sand
 ‘The sand is really hot.’
- (d) *I mākū katoa ahau.*
 PST wet all 1SG
 ‘I was all wet/saturated.’

In example (28), *katoa* is interpreted as quantifying the situation of being ‘white’, meaning that Mount Tongariro was completely covered with snow. Equally, it could be interpreted as an example of discontinuous nominal quantification, where it specifies ‘all of Tongariro’; however, either interpretation results in the same visualisation of the event.

28. *Mā katoa a Tongariro i te hukarere.*
 white all PRS Tongariro reason the.SG snow
 ‘Tongariro was all white with snow.’ (Foster & Foster 1987: 151)

In (29), *katoa* could be quantifying *te ara* meaning ‘the whole road’, or the event that is described ‘completely cover’.

29. *Kī katoa te ara i te wai.*
 full all the.SG path from the.SG water
 ‘The whole road is covered in water.’ OR ‘The road is completely covered in water.’ (after Bauer et al. 2003: 163 [1112])

In the two clauses in example (30), the S-function is singular, and the contribution of *katoa* is somewhat ambiguous. *Katoa* could be understood to discontinuously modify *te rāpeti* ‘the rabbit’, meaning ‘the whole rabbit’. Given examples previously presented in this section, it is also possible that that *katoa* is modifying the verbs *pau* ‘be consumed’ or *kai-nga* ‘be eaten’. In that sense, the situation can be interpreted as meaning ‘completely consumed’, or ‘eaten up’. With either of these interpretations, the end result is unambiguous – the rabbit no longer exists.

30. (a) *I pau katoa te rāpeti i te kāhu.*
 PST be.consumed all the.SG rabbit by the.SG hawk
 ‘The whole rabbit was consumed by the hawk.’
 OR ‘The rabbit was completely consumed by the hawk.’
- (b) *Kua kai-nga katoa-tia te rāpeti e te kāhu.*
 PRF eat-PASS all-PASS the.SG rabbit PASS.AG the.SG hawk
 ‘The whole rabbit has been eaten by the hawk.’ (after *Te Aka Māori Dictionary: -tia*) OR ‘The rabbit has been eaten up by the hawk.’

In the examples surveyed, almost all involve discontinuous *katoa* modifying a plural noun phrase to mean ‘all, every’ rather than modifying a singular noun phrase to mean ‘the whole’.

In addition to the use of *katoa* in the verb complex, it is also possible to use *katoa* in nonverbal clauses. In the examples in (31), there is a distinction in the meaning of *katoa* when positioned in the subject noun phrases of a nonverbal clause, and when positioned in the nonverbal predicate.

31. (a) *He kaiwetereo rātou katoa.*
 NSP linguist 3PL all
 ‘They all are linguists.’
- (b) *He kaiwetereo katoa rātou.*
 NSP linguist all 3PL
 ‘They are wholly/completely linguists’ (as in ‘they are naturally or innately linguists’).

- (c) *He kaiwetereo katoa tērā ākonga.*
 NSP linguist all DIST.DET student
 ‘That student is a natural linguist.’

In the next example, *katoa* in the nonverbal predicate emphasises that all parts of a person have the property that is specified, that is, chieflyness.

32. (a) *He rangatira a Hōne.*
 NSP chief PRS H.
 ‘Hōne is a chief.’
- (b) *He rangatira katoa a Hōne.*
 NSP chief all PRS H.
 ‘Hōne is a complete noble (in that all parts of him are chiefly, his character, personality, poise etc.)’

2.2.3 Distribution of noun phrases discontinuously modified by *katoa*

In §2.2.1, it was shown that discontinuous *katoa* is restricted to S-function and A-function subjects. This produces a pattern of nominative-accusative morphosyntactic alignment, consistent with the analysis of te reo Māori more generally as a nominative-accusative language (see e.g. Chung 1978; Bauer et al. 2003: 534 ff.). Such an analysis sees the subject of an intransitive clause (S-function) treated in the same way as the most agentive participant in a transitive clause (A-function). The more patient-like participant of a transitive clause (O-function) is treated differently. Looking at nominal morphology, the object marker *i* (or *ki*) occurs in transitive clauses with O-function noun phrases; S-function and A-function noun phrases are not introduced by such a marker.

We have seen that S-function arguments in active and passive clauses, as well as in *ko*-fronted topic clauses, can all be discontinuously quantified with *katoa*. Likewise, A-function arguments in active clauses, *ko*-fronted topic clauses and actor-emphatic clauses can all be discontinuously quantified with *katoa*. In contrast, O-function arguments cannot be discontinuously quantified with *katoa*. Such arguments can only be quantified continuously, with *katoa* positioned as a postnominal modifier. Noun phrase marking, and possibilities for continuous and discontinuous quantification in te reo Māori are presented in Table 1.

Table 1. Alignment patterns in te reo Māori

	NP marking	Continuous Quantification	Discontinuous Quantification
S-function	∅	yes	yes
A-function	∅	yes	yes
O-function	<i>i</i> (or <i>ki</i>)	yes	no

Comparing the patterning of noun phrase marking and discontinuous quantification, S-function and A-function arguments are treated in one way, while O-function arguments are treated in another, thus yielding a consistent nominative-accusative patterning. In continuous quantification, a neutral pattern is observed, with all types of noun phrase accepting *katoa* as a modifier.

3 Universal Quantification in the Polynesian Languages

In this section of the paper, we survey universal quantification in a selection of Polynesian languages looking for evidence of discontinuous quantification in particular, to see whether quantification behaves in a similar way to te reo Māori. As noted in the introduction, te reo Māori is a member of the Oceanic branch of the Austronesian language family. Among the Polynesian languages, Māori is classified as Central-Eastern, and the language has been positioned among the Tahitic languages since Green's (1966) subgrouping (see also Pawley (1966) for evidence of higher level subgroups in Polynesian), with evidence being collated and updated by Marck (2000), for the positioning of Māori as well as other languages within Polynesian. This positioning remained received wisdom until Walworth's (2014) reinterpretation of evidence for the Marquesic and Tahitic subgroups. Instead, Walworth argues for the scenario where the speakers of Central-Eastern Polynesian languages "settled on their respective islands at about the same time" (Walworth 2014: 259) and she speculates that their shared linguistic features "may be products of continuous contact and diffusion after the settlement of east Polynesia rather than innovations developed in isolation" (p. 263). Such a scenario is consistent with known oral histories of Polynesian peoples. The older and newer positionings of te reo Māori in Central-Eastern Polynesian are presented in (33), with the key point of difference being the inclusion or removal of a unified Tahitic stage.

33. (a) Polynesian > Nuclear Polynesian > East Polynesian > Central-Eastern Polynesian > [Tahitic >] Māori¹⁸

In examining universal quantification in languages related to te reo Māori, evidence of quantifiers from such languages has allowed the form *katoa¹⁹ to be reconstructed for Proto Polynesian (Greenhill & Clark 2011);²⁰ however, not all languages use a reflex of *katoa as the universal quantifier. In selecting languages to examine, our study has been guided by the availability of existing grammatical accounts, as well as by the availability of language data, whether from grammars, from other published sources, or from native speakers. We have focused on two East Polynesian languages (Cook Islands Māori and Rapa Nui), two Samoic-Outlier languages (Samoan and Tuvaluan), two Tongic languages (Tongan and Niuean), and two Futunic languages (Pukapukan and Tikopian). The relationships between these languages are presented in Figure 1.

¹⁸ The internal relationships of the Polynesian languages are still being debated, with a rather different configuration of East Polynesian in relation to the Polynesian Outliers being proposed by Wilson (most recently, 2021).

¹⁹ In this section of the paper, the use of the asterisk before a word indicates a reconstructed lexeme, following conventions of historical comparative reconstruction.

²⁰ The Proto Polynesian reconstruction *katoa is based on a list of cognate lexemes identified in Polynesian languages. The list is reported on the POLLEX Online website (Greenhill & Clark 2011: KATOA, <https://pollex.eva.mpg.de/entry/katoa/>)

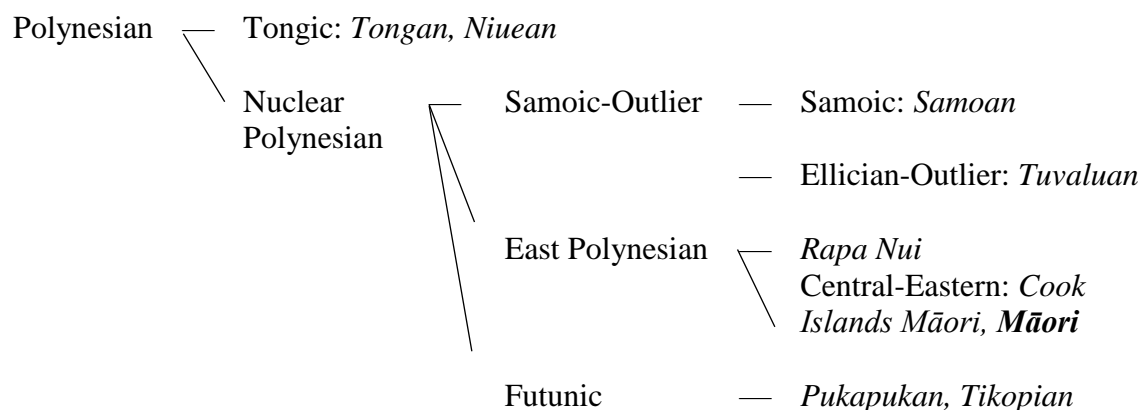


Figure 1. Genetic relationships between selected Polynesian languages

In anticipation of the survey of quantification in selected (largely) Polynesian languages, we offer several observations:

- a number of te reo Māori's linguistic relatives have a pattern of discontinuous universal quantification;
- the form of the continuous and discontinuous universal quantifier may or may not be identical within a given language;
- while reflexes of *katoa are ubiquitous in the Polynesian languages, the universal quantifier may or may not be that reflex;
- among the surveyed languages, only te reo Māori displays a clear nominative-accusative alignment in the patterning of its discontinuous universal quantifier.

3.1 Universal quantification in two East Polynesian languages

Within the East Polynesian subgroup to which te reo Māori belongs, universal quantification is examined in Cook Islands Māori and Rapa Nui. In Nicholas's (2016) study of the Southern Cook Islands language variety, she glosses *kātoatoa* as 'all', and data indicate that it is distributed as a continuous nominal modifier, occurring in phrases such as *tātou kātoatoa* 'we (inclusive) all', and *te pā 'enua kātoatoa* 'all the islands'. There is no evidence in Nicholas's (2016) grammar that *kātoatoa* can function discontinuously. A postverbal modifier with the form *katoa* does occur in Nicholas's (2016) data, but its meaning contribution is 'also'. It provides information about the situation being described, rather than discontinuously quantifying a nominal.

In Rapa Nui, the form *tako 'a* 'only' is reported by Kieviet (2017: 53) as descending via a process of metathesis from Proto Polynesian *katoa 'all, whole'. This postverbal usage is clearly related to the use of *katoa* 'only' in Cook Islands Māori. In terms of universal quantification, Rapa Nui employs *ta'ato'a* 'all, every'²¹ as a continuous nominal modifier (De Feu 1996; Kieviet 2017: 160–162).²² The separate form *tahi* 'all, wholly'²³ is listed as an

²¹ *Ta'ato'a* is claimed to be a borrowing from Tahitian (Kieviet 2017: 160) on the basis that it is not found in older texts.

²² POLLEX Online lists three possible reflexes of PN *katoa in Rapa Nui (Easter Island). The third of these is *ta/?ato?ā*, the form listed in both De Feu's (1997) and Kieviet's (2017) grammars as a nominal quantifier. It is noted as being phonologically irregular (Greenhill & Clark 2011: KATOA). The other two forms in POLLEX are *tako?ā* 'also' (see fn.11), and *toa/toa*, both of which are noted as problematic by Greenhill & Clark (2011).

²³ *Tahi* as a verb modifier in Rapa Nui is thought to have been borrowed from Tahitian (Kieviet 2017: 173), again, on the basis of it not being found in older texts. *Tahi* also functions as the numeral 'one' in Rapa Nui (De Feu 1996: 79; Kieviet 2017: 147).

adverbial modifier by De Feu (1996: 13), and is described similarly by Kieviet (2017) who observes that

tahi has reference not to the action itself (in which case it would indicate that the action happens completely), but to one of the arguments of the verb. This argument is usually plural (whether explicitly indicated or not) and *tahi* indicates that all of the entities referred to by the noun phrase are concerned by the action. (Kieviet 2017: 173)

Tahi in this function is a parallel morpheme to discontinuous *katoa* in te reo Māori; however, it can modify not only S-function and A-function nominals, but also O-function nominals. Examples from Kieviet's (2017) grammar illustrating the discontinuous quantification of S-, A-, and O-function nominals with *tahi* are listed in (34).

34. (a) ...*i haka kāuŋa tahi era te ŋā poki.*
 PRF CAUS line all DIST ART PL child
 '...all the children lined up (formed a line).' (Kieviet 2017: 448 [264, R334.139])
- (b) *He tike'a tahi te ŋā poki i te pahī tu'u*
 NTR see all ART PL child OBJ ART ship arrive
iho mai.
 just hither
 'The children all saw the ship that had just arrived.' (Kieviet 2017: 173 [notes])
- (c) *E aŋa tahi a ia i te ŋa me'e nei.*
 EXH do all PRS 3SG OBJ ART PL thing PROX
 'He should do all these things...' (Kieviet 2017: 161 [58, R647.043])

It is possible for both continuous and discontinuous quantification to occur in a single clause in Rapa Nui. While the translation in (35) points to nominal quantification, it could be the case that the postverbal quantifier is related to the situation of 'thinking exhaustively or completely', rather than the O-function nominal.

35. *He mana'u tahi i te me'e ta'ato'a...*
 NTR think all OBJ ART thing all
 'He thought of all the things...' (Kieviet 2017: 384 [Ftnt. 14 (i), R229.394])

Although Southern Cook Islands Māori and Rapa Nui are genetically closer to te reo Māori than the other languages we investigate in this part of the paper, there are important differences in the presence, form, and function of discontinuous universal quantification. Southern Cook Islands Māori is not reported to employ discontinuous quantification at all; Rapa Nui uses a noncognate quantifier, and permits quantification of O-function arguments as well as S-/A-function arguments.

3.2 Universal quantification in two Samoic-Outlier languages

Samoan (Samoic) and Tuvaluan (Elleccian-Outlier) have continuous and discontinuous universal quantifiers that are expressed by a single form. Samoan's universal quantifier is *'uma* (Milner 1978: 300; Mosel & Hovdhaugen 1992: 712–714), while Tuvaluan has a

quantifier *katoa* (Besnier 2000: 250–254), descending from Proto Polynesian **katoa*. In both Samoan and Tuvaluan, discontinuous quantification is associated with to S-function and O-function nominals, but examples are also given of plural A-function nominals with discontinuous quantification. Of all languages surveyed, Tuvaluan displays the greatest flexibility of discontinuous quantification, with *katoa* being associated with any plural noun phrase, including indirect object nominals, and obliques (Besnier 2000: 251). In all other Polynesian languages, discontinuous quantification appears to be limited to core arguments.

In Samoan, Mosel & Hovdhaugen (1992: 712) describe a verbal origin for the universal quantifier, this being

the frequently used verb *‘uma* “finished, completed, complete, total”. *‘Uma* also postmodifies nouns, and it is attested in constructions such as *‘o tagata ‘uma* ‘all people’ and *‘o tama ‘uma* ‘all the boys’. It can occur as a postmodifier of a verb, where it can mean either that a singular entity is totally affected, or that all members of a plural entity are affected.

Mosel & Hovdhaugen (1992: 712–714) show that both S-function and O-function noun phrases can be discontinuously quantified with *‘uma*. A-function noun phrases can also be quantified, although the conditions under which this can occur are tightly restricted. A-function nominals can only be discontinuously quantified with *‘uma* when the noun phrase directly follows the verb complex, but not when it is positioned elsewhere in the clause, or when it is pronominal (Mosel & Hovdhaugen 1992: 714).

Examples from Mosel & Hovdhaugen (1992) illustrate the use of *‘uma* to discontinuously quantify plural nominals. These patterns are generally replicated by speakers of Samoan who provided data for this project. Interestingly, however, example (36b) shows a speaker preference for continuous quantification of an A-function nominal, rather than discontinuous quantification, in spite of Mosel & Hovdhaugen’s (1992) observation that discontinuous quantification is possible for A-function nominals.

36. (a) *‘Ua palapālā ‘uma o’u lavalava.*
 PRF be.dirty all 1SG clothes
 ‘My clothes are all dirty.’ (Speaker N 2022)
- (b) *‘Ua va’ai e tamaiti ‘uma i le maile.*
 PRF see ERG children.SP all LOC SG.SP dog
 ‘All the children saw the dog.’ (Speaker M 2022)
- (c) *E iloa ‘uma lava e tamaiti le pese.*
 GENR know all EMPH ERG children.SP SG.SP song
 ‘All the children know the song.’ (Mosel & Hovdhaugen 1992: 712)
- (d) *Na ai ‘uma e pua’a o’u umala.*
 PST eat all ERG pig 1SG kumara
 ‘The pigs ate all my kumara.’ (Speaker N 2022)

Samoan’s pattern of discontinuous quantification, whereby unrestricted quantification applies to S- and O-function arguments but only in restricted cases to A-function arguments, is absolute. This contrasts with the nominative pattern seen in data from te reo Māori. Tuvaluan has a neutral pattern, with examples of different types of nominals being discontinuously quantified, including obliques.

3.3 Universal quantification in two Tongic languages

Tongan and Niuean (Tongic) both have continuous and discontinuous universal quantifiers that are expressed by a single form. Tongan's universal quantifier is *kotoa* (also pronounced *kātoa*) (Churchwood 1959) which occurs in noun phrases such as *ko e tamaiki kotoa* 'all the children' and *he Sāpate kotoa* 'every Sunday'. As a discontinuous quantifier, *kotoa* (and *kātoa*) occurs postverbally, and is associated with plural arguments, where these may be S, A or O-function arguments. These patterns were confirmed in new data collected for this paper. The neutral pattern seen in Tongan data is similar to Tuvaluan, although discontinuous quantification is limited to core arguments and cannot apply to obliques in Tongan.

Niuean's universal quantifier is *oti* (Seiter 1979; Sperlich 1997). The source of *oti* is a verb reconstructed to Proto Oceanic with the form *qoti 'finished, complete' (Greenhill & Clark 2011). Data in Seiter's (1979) grammar show *oti* as a postnominal quantifier, in constructions such as *tau fānau oti* 'all the children', *tau uga oti* 'all the crabs', and *a tautolu oti* 'all of us'. As a postverbal modifier, *oti* can quantify S-, A- and O-function noun phrases, but not noncore arguments. Like Tongan, the universal quantifier is associated with plural nominals.

37. (a) *Kua fia-momohe oti tuai e tau tagata nā.*
 PRF want-sleep all PRF ABS PL person that
 'Those people have all gotten sleepy.' (Seiter 1979: 167 [20])

(b) *Kua tele oti tuai e lautolu a au.*
 PRF kick all PRF ERG they ABS 1SG
 'They've all kicked me.' (Seiter 1979: 66 [173.b])

(c) *Maua oti e maua mo Sione e tau mata afi.*
 get all ERG 1DU.EXCL with S. ABS PL piece fire
 'Sione and I have already won all the matches.' (Seiter 1979: 67 [174.b])

The two Tongic languages show a neutral pattern of discontinuous quantification, with plural nominals attracting quantification, regardless of their core function. It would be of interest to investigate preferred interpretations of clauses where more than one core argument is plural, to see if there is a preference for nominative or absolutive quantification in such cases.

3.4 Universal quantification in two Futunic languages

Tikopian and Pukapukan are both Futunic languages. Tikopian has a postnominal quantifier *katoa* 'all' reported by Early (1981: 109) and Firth (1985: 171). It occurs in phrases such as *nga fenua katoa* 'all lands' and *te kai katoa* 'all the food'. It is not reported to function discontinuously by Early, although an extended grammatical analysis of Tikopia has not been completed to date.

Pukapukan has two postnominal universal quantifiers, these being *pau* and *tākatoa* (Salisbury 2002: 420).²⁴ *Pau* derives from an intransitive verb meaning 'complete, finish' (Salisbury 2002: 420), descended from Proto Nuclear Polynesian *pau meaning 'finished,

²⁴ Two quantifiers, *kātoatoa* and *katoa* are described as occurring in Pukapukan as the result of contact from Cook Islands Māori, which is spoken in close proximity to Pukapukan (Salisbury 2002: 420). As language contact phenomena, these are not fully illustrated in Salisbury's (2002) grammar.

over, ended’ (Greenhill & Clark 2011: PAU [NP]). These postnominal quantifiers can occur in combination with an optional prenominal quantifier *wī* ‘all’. Examples of prenominal and postnominal quantification, extracted from Salisbury’s (2002) grammar, are shown in (38), and include both singular ‘whole’ and plural ‘all’ meanings.

38. (a) *te wī tāngata* ‘all the people’
te wī toa ‘all the warriors’
- (b) *te vaka tākatoa* ‘the whole canoe’
te wī ayo tākatoa ‘every single day’
te niu tākatoa ‘all the coconuts’
lātou tākatoa ‘they all’
- (c) *te tangata pau* ‘the whole person’
te wī tamaliki pau ‘every single child’
te kauliki pau ‘all the children’
lātou pau ‘they all’

Turning to discontinuous quantification, both *pau* and *tākatoa* can occur in a postverbal position, quantifying nominals. Pukapukan is a nominative-accusative language with basic VS/VAO constituent order (Salisbury 2002: 349). Discontinuous quantification is associated with S-function nominals (39a-c), as well as O-function nominals (39d).

39. (a) *Kī pau ia Kō...*
 full completely PRS K.
 ‘Kō is completely full...’ (Salisbury 2002: 391 [350])
- (b) *Ko lātou na wō tākatoa ki Kō.*
 TOP they T go.PL all GOAL K.
 ‘They all went to Kō.’ (Salisbury 2002: 422 [555])
- (c) *Na patu-a pau [e te ulīa]_{A-Agent} [nā wale*
 PST hit-PASS all PASS.AG the.SG hurricane the.PL house
i Waletoa.]_{S-Patient}
 LOC W.
 ‘The hurricane destroyed all the houses at Waletoa.’ (Salisbury 2002: 423 [565])
- (d) *Na kave tākatoa [e Tao]_{A-Agent}*
 PST take all ERG.AG T
[te kaluliki nei]_{O-Patient} ki te tukutai.
 the.SG children here GOAL the.SG beach
 ‘Tao took all these children to the beach.’ (Salisbury 2002: 423 [568])

Examples of A-function quantification are included in Salisbury’s (2002) data, although Salisbury (2002: 423–424) suggests that restrictions may apply to discontinuous A-function quantification. In (40), both A- and O-functions are plural, and while the A-function is translated with universal quantification, it would be of interest to explore whether speakers provide alternative English interpretations of the Pukapukan structure.

40. *Ka kave tākatoa tātou i te kauliki nei*
 FUT take all 1PL.INCL OBJ the.SG children here
ki te tukutai?
 GOAL the.SG beach
 ‘Should all of us take these children to the beach?’ (Salisbury 2002: 423 [564])

It may be that pronouns within the verb complex attract quantification over arguments expressed as noun phrases in the clause. It may also be that there are general restrictions related to proximity of pronouns to the quantifier that produce a preference for pronominal quantification over nominal, and that therefore allow the quantification of pronominals that do not have O-functions in transitive clauses. Regardless, it appears that Pukapukan follows a largely absolutive alignment for discontinuous quantification.

4 Historical implications for the descriptive and comparative analysis of *katoa*

In Section 2, we presented an expanded description of *katoa*, the universal quantifier, in te reo Māori. In the description, we sought to clarify the distribution and functions of the morpheme. We made the following observations:

1. *katoa* is distributed as a continuous postnominal quantifier, quantifying all members of a set containing more than one member, or just one member;
2. *katoa* is distributed as a discontinuous nominal quantifier in postverbal position, quantifying all members of a set containing more than one member, or just one member;
3. *katoa* is distributed as a continuous modifier in both verbal and nonverbal predicates, quantifying the entirety of a situation or property specified in the predicate.

These three distributions and associated quantifying function were revealed through an examination of the types of nouns that can be modified by *katoa* (§2.1.1), co-occurrence possibilities and restrictions that apply to combinations of pronominal modifiers with *katoa* (§2.1.2 and §2.1.3), a survey of noun phrases in different types of clauses that can be modified continuously and discontinuously by *katoa* (§2.1.5 and §2.2.1), and the identification of verb complexes that can be modified continuously by *katoa* (§2.2.2).

Looking at discontinuous quantification narrowly, we have confirmed Bauer et al. (2003) and Harlow’s (2015) descriptions of *katoa* as a subject quantifier when it occurs in a postverbal position (§2.2.3). In this position, we noted that *katoa* is more often associated with plural noun phrases, and that there is sometimes ambiguity in the syntactic interpretation of postverbal *katoa*. This particularly arises with stative verbs where *katoa* can quantify the situation expressed by the verb, and further examination of continuous modification in the verb complex would be useful. We also noted the presence of *katoa* in the predicates in nonverbal clauses and a more detailed examination of this phenomenon would be of interest.

In Section 3, we surveyed a selection of languages from different branches of Polynesian. It was seen that reflexes of Proto Polynesian **katoa* regularly appear in the Polynesian languages, but that not all languages have retained **katoa* as their universal quantifier. Regardless, continuous universal quantification is expressed in all the languages surveyed. Discontinuous quantification is seen in all branches of Polynesian, although it is

not a documented feature of Southern Cook Islands Māori in East Polynesian, and there is insufficient data for Tikopian in the Futunic branch for an analysis to be made.

Variation in the form of universal quantifiers has led us to identify multiple sources of quantification, shown in Table 2. The most widespread source of the universal quantifier is the direct inheritance of a reflex of *katoa from Proto Polynesian. The four other sources we have recorded appear to be language-specific developments from stative verbs meaning ‘finished, complete’, or the stative numeral ‘be one’. With the exception of ‘*uma* in Samoan, where there is no clear antecedent, in each language, the stative source lexeme has been reconstructed to an earlier stative lexeme, and the older verbal function is retained alongside the newer function of quantification.

Morphology of the Oceanic languages, in particular morphology of the verb complex, has been described as involving *replacement*. Lynch et al. (2002: 83–88) observe the replacement of negators and other elements of verbal morphology in Oceanic languages. Barbour (2015) more narrowly describes the replacement of negators in the Oceanic languages of Malekula Island in Vanuatu. Ross (2004: 498–503) gives examples of replacement in the pronoun paradigms of Oceanic languages. Considering universal quantification, it is clear that universal quantifiers are also affected by replacement in a number of languages, with Niuean and Samoan showing full replacement, Rapa Nui showing replacement of the discontinuous quantifier and Pukapukan showing alternative quantifier forms. The form of quantifiers in Rapa Nui in particular suggests that replacement occurs first in the postverbal position, and from there spreads to postnominal quantification. Where replacement occurs, the replacement morphemes inherit the continuous/discontinuous distribution pattern seen in languages that retain a reflex of *katoa.

Table 2. Retention, Alternation and Replacement of Universal Quantifiers in Selected Polynesian Languages

Quantifier source	Language	Continuous NP quantifier	Discontinuous quantifier
Proto Polynesian *katoa ‘all’	Māori (Aotearoa)	Retained: <i>katoa</i>	Retained: <i>katoa</i>
	Māori (Cook Islands)	Retained: <i>kātoatoa</i>	---
	Tuvaluan	Retained: <i>katoa</i>	Retained: <i>katoa</i>
	Tongan	Retained: <i>kotoa</i>	Retained: <i>kotoa</i>
	Tikopian	Retained: <i>katoa</i>	(insufficient data)
Proto Oceanic *qoti ‘finished, complete’ (verb) > <i>oti</i>	Niuean	Replaced: <i>oti</i>	Replaced: <i>oti</i>
Proto Nuclear Polynesian *pau ‘finished, complete’ (verb)	Pukapukan	Retained: <i>tā/katoa</i> Alternative: <i>pau</i>	Retained: <i>tā/katoa</i> Alternative: <i>pau</i>
Proto Nuclear Polynesian *tasi ‘one, only’ (numeral/verb) > <i>tahi</i>	Rapa Nui	Retained: <i>ta’ato’a</i>	Replaced: <i>tahi</i>
Samoic-Outlier > Samoan Samoan ‘ <i>uma</i> ‘finished, complete’ (verb)	Samoan	Replaced: ‘ <i>uma</i>	Replaced: ‘ <i>uma</i>

In contrast, Tongan, Tuvaluan, and Māori all show the retention of *katoa as a universal quantifier, in both continuous and discontinuous patterns. Although Pukapukan has alternative forms of quantifiers, a reflex of *katoa can also occur in continuous and discontinuous patterns. Given this distribution of reflexes of *katoa across both structural patterns, it seems likely that *katoa was both a continuous and a discontinuous nominal quantifier in early Polynesian.

The dual senses of *katoa* as ‘all’ and ‘whole’ in te reo Māori, the similar patterning noted in several other Polynesian languages, and the observation from Rapa Nui that quantifier replacement affects the verb complex before the noun phrase, suggest a pathway of grammaticalisation in different languages from different lexical starting points. This pathway begins with a stative verb meaning ‘finished, complete’ (41a), and in one case the numeral ‘be one’ (41b). A different pathway of change is suggested by the shift from *katoa ‘all’ to postverbal limiter ‘only’ in Southern Cook Islands Māori and Rapa Nui (41c). The dual functions of ‘all’ of a plural entity and ‘the whole’ of a singular entity provide a source for the use of the reflex to signal quantification of situations, as being ‘wholly, completely’ executed, and from there to being the ‘only’ situation executed.

41. (a) v. finished, complete > VMOD. wholly, completely > MOD. whole, all
 (b) v. be.one > VMOD. wholly, completely > MOD. whole, all
 (c) MOD. all, whole > VMOD. wholly, completely > VMOD. only

In addition to different synchronic forms of the universal quantifier that point to different diachronic sources, there are also distributional differences in the way that discontinuous quantifiers associate with noun phrases (shown in Table 3). All languages with discontinuous quantification show quantifier association with S-function nominals. Discontinuous O-function quantification is generally more common, and less restricted than A-function quantification, giving a pattern of absolutive quantifier association, seen in Samoan and Pukapukan. Neutral quantifier association, where any plural core argument can attract discontinuous quantification, is seen in Rapa Nui, Niuean, Tongan, and Tuvaluan. Research into speaker-interpretations of clauses with two (or more) plural arguments is needed to better understand these neutral systems.

Table 3. Quantifier Association Patterns in Selected Polynesian Languages

Language	Association of Discontinuous Quantification	Alignment of Discontinuous Quantification
Samoan	S, O (restricted A)	Absolutive quantifier association
Pukapukan	S, O (restricted A)	
Rapa Nui	S, A, O	Neutral quantifier association
Niuean	S, A, O	
Tongan	S, A, O	
Tuvaluan	S, A, O, IO, Obl	
Māori (Aotearoa)	S, A	Nominative quantifier association
Māori (Cook Islands)	---	No documented quantification association
Tikopian	?	(Insufficient data for analysis)

Finally, we come to te reo Māori, in which O-function noun phrases can never be discontinuously quantification; instead, discontinuous quantification can only associate with S-/A-function noun phrases, producing nominative quantifier association. Among the languages surveyed, this pattern is unique.

This paper has focused on the seemingly simple universal quantifier *katoa* ‘all, every’. An in-depth examination of the behaviour of *katoa* in te reo Māori and a comparative study of similar quantifiers in related languages have pointed to complex semantic and morphosyntactic patterning of universal quantifiers. We propose that further detailed research into aspects of te reo Māori and the related Polynesian languages, led by speakers of those languages, will allow us to better understand both their current forms and functions, and their prehistories.

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Appendix I: Pedagogic applications

Teaching/learning te reo Māori

There is very limited content that deals specifically with *katoa* in existing pedagogic materials for te reo Māori learners. The clear meaning relationship between the different uses of *katoa* make it an accessible aspect of Māori grammar which could either be taught explicitly or introduced organically, as examples of *katoa* arise in teaching materials. The distribution and functions of *katoa* that we have presented in this paper suggest that there are several occasions when *katoa* could be brought to students' attention:

1. when teaching noun phrase modifiers, particularly contrasting singular and plural forms of pronominal modifiers, since these affect the interpretation of *katoa* as 'all, every' or 'the whole';
2. when teaching postverbal modifiers, where there is an opportunity to introduce the discontinuous quantifying function of *katoa* as a subject modifier, as well as the continuous 'wholly, completely' function of *katoa* as a modifier of stative situations;
3. when teaching passive constructions, along with the set of manner particles that take passive suffixes, again highlighting the subject-quantifying function (as opposed to quantifying the agent);
4. when teaching *ko*-topic constructions, particularly with regards to the fronting of *katoa* in topic constructions.

Teaching linguistic concepts

Linguistic textbooks only rarely include data from te reo Māori and the Polynesian languages of the Pacific. The data included in this paper could be used to illustrate the following concepts (among others):

1. universal quantification;
2. continuous and discontinuous modification of nominals;
3. co-occurrence restrictions in the noun phrase;
4. polyfunctionality of grammatical morphemes;
5. morphosyntactic alignment patterns, where te reo Māori's nominative quantifier association can be compared with, for example, Samoan's absolutive quantifier association, Rapa Nui's neutral quantifier association, and Southern Cook Island Māori's lack of discontinuous quantification;
6. language change processes: the grammaticalisation of verbs as quantifiers; language change processes: retention, replacement, alternation and loss of grammatical morphology.

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