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COMMON SOCIAL EMOTIONS IN TE REO MĀORI SPEECH

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Abstract

While emotion-based studies are extensive in some languages, many of the world's languages remain under-represented. Te reo Māori, the Indigenous language of Aotearoa New Zealand, has received little attention in this area. Existing studies often assume emotions are universal, which is arguable given that the research used to verify this assumption lacks cultural appropriateness. Evidence suggests that presumed universal emotions may not fully capture Māori emotional expressions. This study presents a community-oriented approach to identify common social emotions in te reo Māori speech as a foundation for emotion-based research. A questionnaire with community media samples was conducted to gather opinions from fluent Māori speakers on the emotions conveyed. After the emotion terms were filtered from responses, a focus group was conducted to further group these terms. The findings reveal 16 culturally relevant emotion categories not fully captured by universal models, highlighting the need for culturally grounded approaches in emotion-based applications.

Keywords

co-development, community-oriented research, emotion categorisation, te reo Māori

Introduction

Emotions are a part of our daily lives and influence how we respond to the world. Understanding the emotions of those around us is critical for effective communication and underpins fields such as psychology, where emotions inform cognition, behaviour, mental health, and emotional well-being (Simon, 2014; Van Kleef & Côté, 2022). In today's technology-driven era, there are tools that identify emotions in speech or robots with voices that express emotions (Koolagudi & Rao, 2012; Schröder, 2001). While emotion-based studies are common in Western languages such as English (Taj et al., 2023), they remain limited for Indigenous languages such as te reo Māori, the Indigenous language of Aotearoa New Zealand.

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Emotion-based studies often rely on categories derived from Western emotion research, regardless of cultural context (Busso et al., 2008; Livingstone & Russo, 2018; Peter & Ho, 2022). Ekman's discrete emotion model, commonly applied, classifies emotions into six basic categories: anger, disgust, fear, happiness, sadness, and surprise (Ekman, 1992). Although widely used, scholars have criticised the cultural appropriateness of the model, noting it was developed by non-Indigenous researchers without meaningful input from Indigenous communities or a sufficient understanding of their linguistic and cultural contexts (Crawford, 2021; Russell, 1991). Consequently, these emotion models may misrepresent Indigenous perspectives on emotions. Whether emotions are universal or culturally shaped remains unresolved, casting doubt on the value of research based on these emotion models. For te reo Māori, studies suggest that presumed universal emotion categories may not fully reflect Māori emotional experiences, indicating that emotional universality may be an inadequate assumption (Elder, 2020).

Given these challenges, it is essential to understand how Māori emotions can be categorised. This study identifies emotions through a community-oriented approach involving collaboration between Indigenous and non-Indigenous researchers to ensure cultural appropriateness and community benefit, as mentioned in Bird (2020) and James et al. (2024). It examines whether Māori emotions align with Ekman's universal emotion categories or include nuanced emotions unique to Māori. To explore this, we analysed community media and conducted a questionnaire and focus group to gather feedback from the community on the emotions expressed in such media. Since the resulting emotion categories were derived from speech occurring in community media, they represent emotions that are commonly expressed within social interactions of the Māori community. For this reason, we refer to them as *common social emotions*. The resulting emotion categories will help build emotion knowledge and guide future emotion-based research in te reo Māori.

The article is structured as follows: The first section outlines limitations of emotion categorisation in current literature and offers insights into Māori emotions, including speech technology development and ethical considerations in Indigenous research. The second section details the methodology for identifying common social emotions in te reo Māori speech. The third section presents the identified emotion categories and analysis. The fourth section highlights key differences between Māori and presumed universal emotion categories and discusses future applications. The final section summarises the main findings.

Background

Categorisation of emotions

Emotion lacks a universally accepted definition (Cahour, 2013). Kleinginna and Kleinginna (1981) reviewed 100 definitions and statements of emotion in the literature and proposed a broad definition of emotion. They described emotion as a complex set of interactions among subjective and objective factors, influenced by neural and hormonal systems and involving physiological adjustments, cognitive processes, behaviour, and affective experiences such as feelings of arousal and pleasure.

Many emotion theories and models exist. One of the most widely used is Ekman's discrete emotion model, which classifies emotions into six basic emotions: anger, disgust, fear, happiness, sadness, and surprise (Ekman, 1992; Ekman & Friesen, 1971). Ekman considered these emotions universal and tested them through cross-cultural studies, including one with Indigenous people in Papua New Guinea (Ekman & Friesen, 1971). In these studies, participants viewed facial expressions, heard a story, and selected the facial expression matching the emotion conveyed in the story. While these studies support emotional universality, their methodology has limitations, such as the forced-choice format, which restricted participants to predefined options. Moreover, these studies were conducted by non-Indigenous researchers with no collaboration with Indigenous researchers, and they did not incorporate Indigenous knowledge, thereby limiting scope and cultural relevance (Crawford, 2021; Russell, 1991, 1993). Variations of the discrete emotion model have since emerged (Ekman, 1999; Jack et al., 2016), yet the universality of these models remains unproven, and no definitive set of basic emotions has been established.

Elegant translation of vocabulary that describes emotion is often non-trivial, especially between languages that are not closely related (Banks, 1996). For instance, Levy (2014) found that Tahitians lack a direct equivalent term for sadness, although they still experience it, describing it as feeling heavy, fatigued, or troubled. This suggests that direct translation between languages may inadequately capture emotion categories. Additionally, Banks (1996) noted that the idea of universal basic emotions is debatable because even Western scholars disagree on their number

and nature. Given these limitations, preliminary research is essential to identify common social emotion categories in a culture before conducting emotion-based studies; we cannot assume an emotion vocabulary formed from another language or culture.

Te reo Māori emotions

Te reo Māori, the Indigenous language of Aotearoa, is fluently spoken by approximately 71,000 people, around 1.5% of the country's population (Nicholson Consulting and Kōtātā Insight, 2021). Because of colonial practices that actively discouraged the use of te reo Māori, only 7.9% of the Māori population are fluent speakers today (James et al., 2022). However, most Māori remain bilingual, speaking both English and te reo Māori (Nicholson Consulting and Kōtātā Insight, 2021).

In te reo Māori, emotions are often referred to as kare ā-roto. The term *kare ā-roto* itself refers to the "ripples within" and encompasses the physical and spiritual manifestations of how emotions are experienced, understood, and expressed (Pihama et al., 2019). This understanding reflects a broader te ao Māori perspective in which emotions are viewed as integral to being human, as well as to natural systems, words, and thoughts (Brice, 2020; Solomon, 2021). They are also linked to human body organs, such as the ngākau, puku, and ate (Pihama et al., 2019). While no formal Māori emotional framework exists, several dictionaries list emotions in te reo Māori. Table 1 shows examples, demonstrating the diversity of terminology. All modern Māori dictionaries or wordlists stem from Williams's (1971) dictionary. None of these studies refers to experimental research on identifying emotions in te reo Māori.

Dictionary analysis of Māori emotion terms found categories such as *being perplexed*, *desire*, *yearning*, and *being diminished*, which are significant to Māori but largely overlooked in Western research (Parrott & Harré, 1996). Another study found differing emotion patterns between Māori and Pākehā in social situations by comparing their reactions to several whakamā-inducing scenarios; for example, Māori reported feeling less embarrassed than Pākehā when singled out for public praise (Banks, 1996). Māori psychiatrist Elder (2020) suggested that nuances of Māori emotions are lost in English translation (p. 16). Māori also has a rich emotional vocabulary without direct English equivalents, including the terms *wana*, *wehi* and *ihi* (Ritchie, 2021). Thus, relying on English-defined emotions or their closest translations may be inadequate for te reo Māori. It is crucial to first establish common social emotion categories before conducting emotion-based research in te reo Māori.

Speech and language technology for te reo Māori

Machine learning–based technology for te reo Māori is growing. Te Reo Irirangi o Te Hiku o te Ika (Te Hiku Media), for example, has developed datasets and tools such as automatic speech recognition, part-of-speech tagging, text-to-speech (TTS), and bilingual speech recognition (Duncan et al., 2024; Jones et al., 2023; Te Hiku Media, 2025). There is also active involvement from academia in Māori technology development; tools include a vowel pronunciation aid (Watson et al., 2017), TTS systems (James et al., 2020; Shields et al., 2019), and language detection tools (James et al., 2022). Despite these efforts, artificial intelligence remains biased against te reo Māori (Jones

TABLE 1 Te reo Māori emotion lists from different sources

Source	Emotion terms
Ngata and Ngata (1993)	hari (joy), pōuri (grief), wehi (fear), mauāhara (hate), aroha (love)
Tauroa and Tauroa (2006)	pōuri (sadness/sympathy), hari (happiness), riri (anger), mataku (fear), whakahau (encouragement), poroporoaki (farewell)
Sinclair and Calman (2012)	riri (angry), whakamā (ashamed/embarrassed/shy), toa (brave), rangirua (confused), pai (fine/good/okay), koa/hari koa (happy), pūhaehae/hae/wene (jealous), māngere (lazy), āmaimai/taiatea (nervous), manawanui (patient), mārie (peaceful), whakahīhī (proud), manawapā (reluctant), pōuri (sad), ngenge (weary)

et al., 2023). While Google and Microsoft Azure support tasks such as machine translation and language detection, their accuracy is low (James et al., 2022; Keegan, 2017).

Emotion-based technology is extensively researched for well-resourced languages, such as English, German, Mandarin, and French (Taj et al., 2023), but remains scarce for low-resource languages. Low-resource languages are languages that lack sufficient data for technology development (Paccotacya-Yanque et al., 2022). Currently, no emotion-based technology exists for te reo Māori, which is also low-resource. Adapting tools from other languages may misalign with the Māori cultural context. Therefore, it is crucial to build emotion-based technology from the ground up using emotions significant to Māori. This study serves as a foundational step towards developing such technology for te reo Māori.

Ethical considerations for Indigenous research

Indigenous languages such as te reo Māori have been deeply impacted by colonisation. Colonial research practices often took a commodification approach, prioritising profit over cultural value (Bird, 2020). This led to mistrust among Indigenous communities towards non-Indigenous researchers (Datta, 2018). Studies on speech and language were frequently conducted without linguistic expertise or meaningful community engagement, resulting in biased representations and exclusion of Indigenous perspectives (Bird, 2020; Jones et al., 2023).

Addressing these challenges requires co-developing solutions with Indigenous communities, guided by their needs and enabling proper stewardship (Bird, 2020; James et al., 2024; Te Hiku Media, 2025). Leoni et al. (2024) showed that involving Indigenous language specialists enhances problem-solving and cultural integrity in technology development. Accordingly, this study identifies common social emotion categories in te reo Māori speech, with community involvement throughout.

Indigenous data, especially emotional speech, can include culturally sensitive or sacred content. Data sovereignty is vital for protecting such knowledge. It refers to managing data in line with the laws, customs, and practices of the nation or state where it resides (Te Hiku Media, 2025; Te Mana Raraunga, 2023). Te Hiku Media exemplifies this practice by carefully deciding what data is collected, how it is gathered, who can access it, and how it is used (Jones et al., 2025).

These principles will be upheld throughout this study. Half of the research team are Māori Indigenous researchers, and the study methodology has been informed by community feedback and shaped to reflect their needs. Transparency is maintained regarding how participants' input is used, and outcomes are shared with the community.

Methodology

As noted in the previous section, identifying common social emotion categories and verifying the universality of emotion categorisation, with active community involvement, is a key first step in culturally grounded emotion research. This section outlines our methodology to identify common social emotions expressed in te reo Māori speech through a community-oriented approach.

The overall research framework is shown in Figure 1 and includes five key stages:

1. Te reo Māori emotional speech collection—Emotion-rich speech was sourced from community media.
2. Bilingual questionnaire—Fluent te reo Māori speakers identified common social emotions.
3. Emotion term filtering—Questionnaire responses were analysed to refine emotion terms.
4. Focus group discussion—Te reo Māori speakers grouped emotions into broader categories.
5. Speech emotion recognition technology development—Final emotion categories will inform future emotion-based speech technology.

Stages 1–3 were detailed in a previous study (Rathnayake et al., 2024), but a brief overview is provided for context. This article focuses on Stage 4. Stage 5 represents future work, exploring how the identified emotion categories can be applied (see the discussion section). The proposed methodology aligns with Chung et al.'s (2024) framework for integrating Indigenous knowledge into information technology design.

Te reo Māori emotional speech collection

The initial stage involved collecting emotional speech recordings from Te Hiku Media radio broadcasts and te reo Māori TV shows available through the University of Auckland library. The TV shows included *Kairākau*, *Harakore*, *Mura o te Ahi*, *Karawhiua*, *Rere te Whiu*, *SpongeBob Tarau Porowhā*, *Waka Huia*, *Whaikorero*, *Pūkana*, *Kahungunu Matangi Rau*, *The Penguins of Madagascar*, *Nanakia*, and *Ahikāroa*.

Recordings were obtained with proper permissions by providing complete information about the

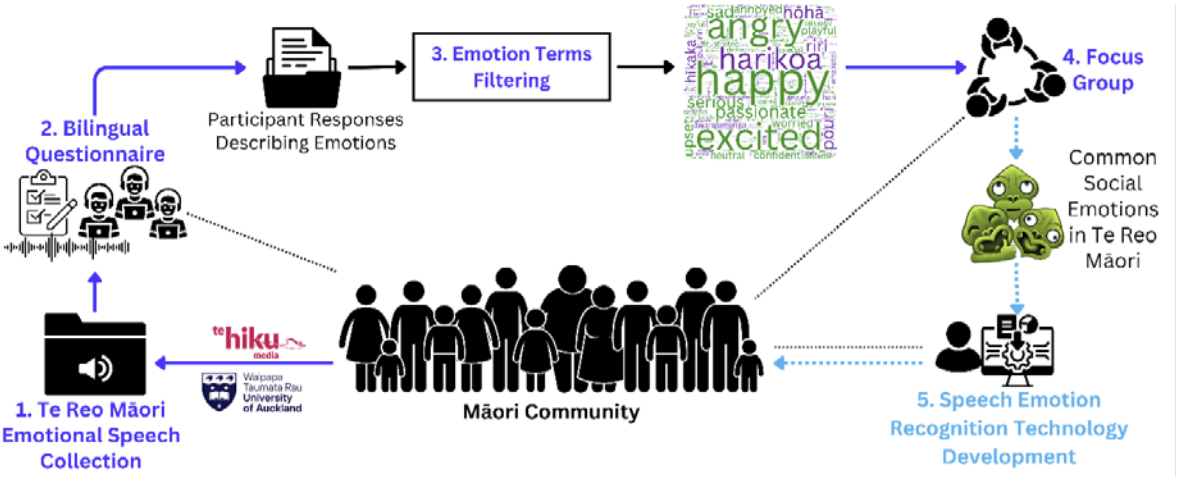

FIGURE 1 The research framework for emotion-based technology development

research purpose. These sources were chosen for their naturally occurring emotional speech across diverse social contexts. We reviewed the recordings to identify audio clips containing emotion-rich content.

Bilingual questionnaire

In Stage 2, we designed a bilingual questionnaire in te reo Māori and English using community media recordings to gather feedback on emotions expressed. It included five sets of 20 audio clips (10–30 seconds each), randomly selected from emotion-rich content, and reviewed by Māori researchers.

Any fluent te reo Māori speaker could participate in the questionnaire. Each was presented with a random set of audio clips and could respond in te reo Māori or English, providing a list of emotion terms or detailed explanations. To avoid influencing participants' interpretations and allow them to describe emotions in their own words, the questionnaire used open-ended questions without predefined emotion labels, examples, or suggested responses. This approach accounted for the complexity of defining emotions, variability in how individuals interpret emotional experiences, and the challenges of retrieving specific emotion vocabulary in a revitalised language context. Responses in English were accepted because the Māori speakers are bilingual, and while they may express emotions linguistically in English, the emotional model itself can remain culturally Māori. Māori researchers promoted the questionnaire via email and social media. A total of 42 participants completed it, and each clip was reviewed by 7 to 9 participants.

Emotion terms filtering

In Stage 3, we manually marked key emotion terms from questionnaire responses, which included detailed explanations. We then removed non-emotional terms that described the actions of the speakers in the recordings rather than their internal emotions. Key terms in te reo Māori were reviewed by Māori researchers. This process yielded 218 emotion terms in both English and te reo Māori. Because participants were encouraged to describe emotions in their own words rather than select predefined labels, the identified terms appeared in a variety of linguistic forms, including nouns, adjectives, and descriptive expressions. To preserve participants' original interpretations and language use, we retained the terms in their original forms rather than standardising them into a single grammatical category. Where multiple grammatical forms of the same emotion concept were identified (e.g., noun and adjective forms), the form most frequently used by participants was retained.

Rathnayake et al. (2024) provided a detailed account of media collection, participants, and emotion term filtering. They found that among the 218 emotion terms identified, multiple te reo Māori terms appear to correspond to the same English emotion category, suggesting the potential for grouping similar terms or synonyms. For example, *hākoakoa*, *harikoa*, *koa*, and *koakoa* aligned with the English category *happiness*. However, translating these terms into English may obscure subtle cultural nuances. While some Māori emotion terms may represent synonymous, closely related, or regionally varying expressions of similar emotional experiences, others may reflect culturally grounded concepts that extend beyond

the meanings conveyed by their nearest English translations. Therefore, expert input is essential to determine whether such terms are truly equivalent or convey distinct meanings.

Focus group experiment

The next step was to group the identified emotions into broader categories without losing nuances. We conducted two online focus group sessions with te reo Māori speakers, using Zoom as the platform, each session lasting approximately two hours.

Participants: Six te reo Māori speakers participated in each session. One participant from the first session was replaced in the second. A Māori researcher with advanced te reo Māori competency moderated the discussion, while three other team members observed.

Ethics: Ethics approval was obtained from the University of Auckland Human Participants Ethics Committee on 26 May 2023 for three years (Ref No. 25611). Before the focus group, participants received the Participant Information Sheet and the emotion term list and gave informed consent via an online form. They were not required to review the emotion term list in advance. At the start of the session, the project overview, focus group purpose, and intended use of the discussion were explained.

Cultural sensitivity: Each session began and ended with karakia, following Māori cultural protocols. Participants could speak in either te reo Māori or English, allowing them to express themselves in their preferred language.

Focus group task: Participants were asked to group the 218 emotion terms according to similarity, keeping distinct emotions separate. They could create as many groups as needed, each group potentially containing a mix of English and te reo Māori terms, with no limit on group size. Emotions could also stand alone in individual groups. At the end, participants proposed names for each group, choosing from the given emotion list or suggesting their own.

Emotion terms visualisation: To visualise the 218 emotion terms and support discussions on how the emotions could be grouped, we used Miro board software (https://miro.com/), shown in Figures 2–5. Miro was chosen for three reasons: it displays all terms on one board, allows free movement of emotion terms for grouping, and enables colour coding to distinguish emotion groups.

The 218 terms were divided into 11 sets, prioritised by frequency of use in the questionnaire responses to avoid overwhelming participants. One set at a time was shown to the participants, and once they had grouped the terms in it, the next set was introduced. The moderator shared their screen via Zoom, displaying the Miro board, and facilitated the discussion by organising terms and assigning colours according to participant input.

Results analysis

Figures 2–5 illustrate the progression of the focus group. Figure 2 shows the first set of 20 emotion terms, including some of Ekman's basic emotions, such as *happy*, *sad*, *angry*, and *excited*, along with some of their closest Māori translations, such as *hari* and *koa* (happy), and *mamae* and *pōuri* (sad). During this initial phase, participants began loosely grouping the terms.

After the first five sets of emotion terms were roughly grouped (see Figure 3), the moderator asked participants to review and regroup them,

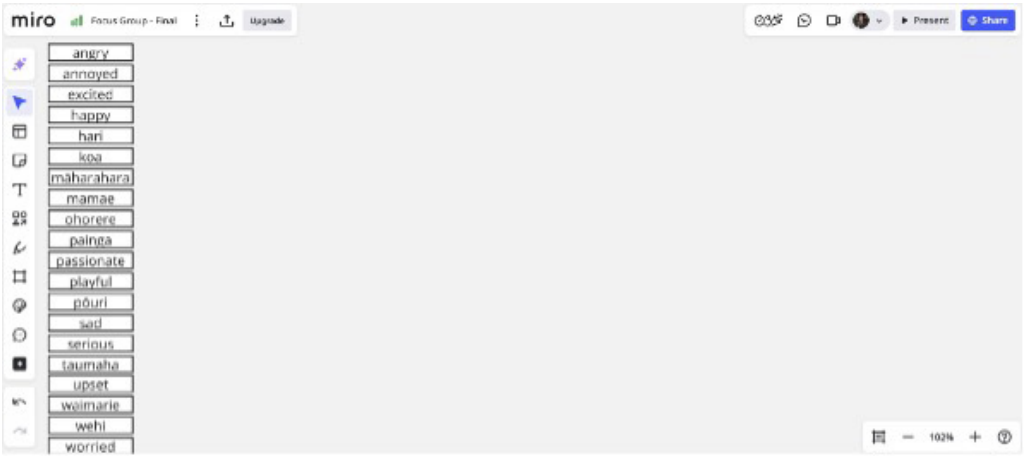

FIGURE 2 Shared screen view at the start of the focus group

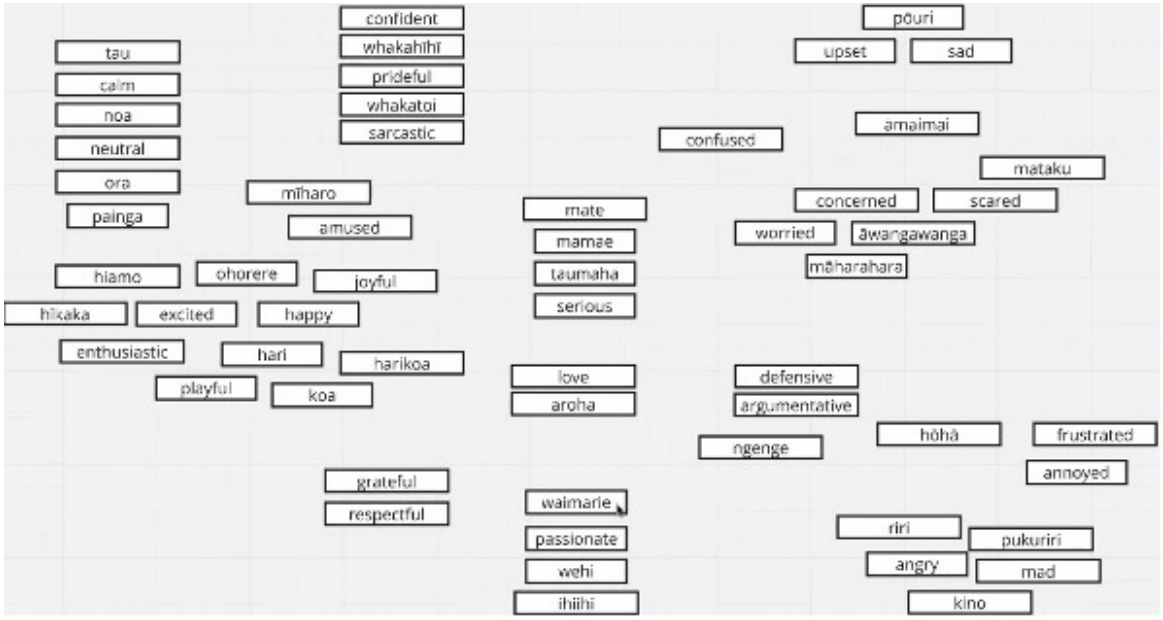

FIGURE 3 Shared screen view after a few iterations

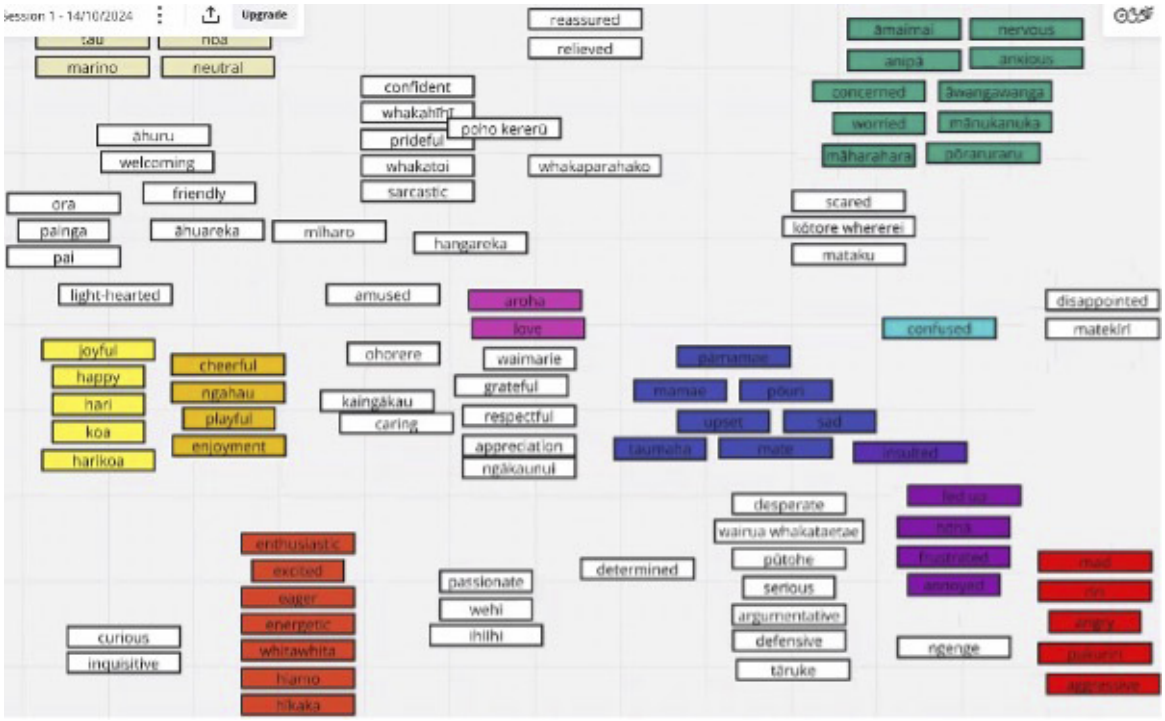

FIGURE 4 Screen view after initiating colour coding

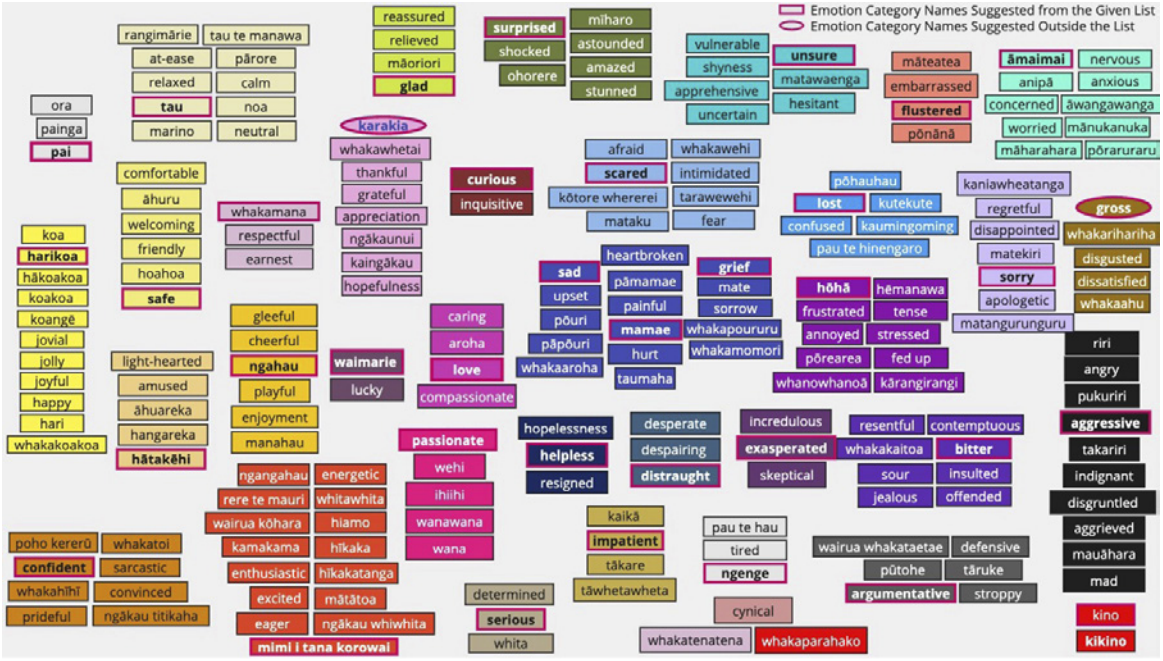

FIGURE 5 Shared screen view with the final emotion categories

assigning different colour codes. The result is shown in Figure 4. Participants used different shades of the same colour for emotions they felt were related, for example, shades of yellow for categories starting with *joyful* and *cheerful*. As more terms were introduced, some shifted groups; for instance, *hiamo* and *excited* initially grouped with *happy* (see Figure 3), later formed a separate group (see Figure 4).

The first session ended after seven sets of emotion terms (140 terms) were grouped. In the second session, participants grouped the remaining terms. The focus group then reviewed all emotion groups, moving terms for a better fit and discussing suitable names. With no naming restrictions, participants suggested names in English or te reo Māori, reflecting the bilingualism of Māori speakers and the interplay between the two languages. Some emotion groups were named with terms outside the original list, such as *gross* and *karakia*. Although *karakia* is not an emotion, it was chosen because all the emotions in that group related to activities. Figure 5 shows the final screen. The focus group discussion identified 37 emotion categories, with three additional stand-alone terms: *cynical*, *whakatenatena*, and *whakaparahako*.

During the initial stage of the study, when we filtered the emotion terms, some te reo Māori terms had unclear emotional interpretations. The research team reviewed audio clips to clarify their meanings within their respective contexts. The moderator facilitated discussions to help participants define the emotional meanings of these terms.

Focus group observations

A key observation from the focus group was that participants naturally classified emotions as positive or negative without moderator guidance. For example, *harikoa* and *happy* were seen as positive, while *pōuri* and *sad* were seen as negative. Later, though, participants acknowledged that some emotions could not be clearly classified as positive or negative. Terms such as *passionate*, *pōnānā* (which means anxious or eager), and *wehi* (which means awesome or fear) were context dependent. The focus group also tried to position similar groups near each other; for instance, in Figure 5, *harikoa* and *hātakēhi* appear close together, as do *aggressive* and *bitter*, although the two groups are placed apart because of their positive or negative nature.

Participants found the initial emotion sets easier to group because they contained the most frequently occurring and well-known terms. Towards the end, grouping became more difficult, and some participants consulted dictionaries to interpret less frequent terms. This challenge may reflect the limited use of certain emotion terms in te reo Māori, a language undergoing revitalisation, which is an important consideration when working with revitalised languages.

Co-occurrence matrix analysis

To assess whether the 40 emotion categories identified in the focus group could be further grouped, we referred to the questionnaire responses reported above. Different participants sometimes used terms from multiple emotion categories to describe the same audio clip. In this study, we refer to this pattern of overlapping emotion terms as *co-occurrence*. This pattern could reflect two possibilities.

1. First, participants may have used different terms to describe the same emotion. For example, if some participants used terms from the *mamae* category while others used terms from the *sad* category to describe the same audio clip, this may indicate that the two sets of terms were being used to refer to the same emotion. In this case, mamae and sad could potentially be grouped into a broader emotion category.
2. Second, the co-occurrence of different categories may indicate that an audio clip was perceived as conveying multiple emotions. For example, one speaker from the audio clip expressed *riri*, while another expressed *pōuri*. Therefore, co-occurrence alone could not be assumed to indicate that two categories represented the same emotion. To account for this ambiguity, the co-occurring categories would need to be reviewed by te reo Māori experts within the research team to determine whether they represented sufficiently similar emotions to further grouping.

This motivated the following analysis. We first identified co-occurring emotion pairs by checking whether terms from each pair of emotion categories were used by different participants to describe the same questionnaire audio clip. These co-occurring pairs were then represented in a 40 × 40 co-occurrence matrix, with each row and column corresponding to one of the 40 emotion categories. While the full matrix includes all 40 emotion categories, a subset containing six categories is shown in Figure 6 to illustrate the process. Each cell represents the strength of the association between a pair of emotion categories based on their co-occurrence across the questionnaire responses.

To quantify the strength of these associations, we used a frequency-weighted approach. This considered not only whether two categories co-occurred but also how frequently terms from each category were used to describe the same audio clip. For each audio clip, the frequency of terms from one category was multiplied by the frequency of terms from the other category to obtain the weighted contribution for that pair. For example, if terms from the mamae category were used twice and terms from the sad category were used three times to describe the same audio clip, this contributed a weight of 6 (2 × 3) to their co-occurrence. In contrast, if each category was used only once, the contribution would be 1 (1 × 1). These weighted contributions were then summed across all audio clips for each emotion-category pair. For example, the (mamae, sad) pair has a value of 70, representing the cumulative weighted co-occurrence of these two categories across the audio clips. Higher values indicate stronger associations between emotion categories based on the frequency with which terms from the two categories were used to describe the same audio clips. These associations were used to identify pairs of categories as potential candidates for further examination and possible grouping.

Similarity score measure

The raw co-occurrence frequencies shown in Figure 6 are influenced by how frequently each emotion term occurs overall and therefore do not, by themselves, provide a reliable measure of the strength of association between two terms. For example, if *pai* occurs 32 times and co-occurs with *tau* in all 32 cases, this represents a stronger association than if *sad* occurs 100 times but co-occurs with *tau* in only 32 cases. Although both pairs have the same raw co-occurrence frequency, the proportion of occurrences associated with tau is substantially different.

To account for differences in how frequently individual emotion terms occurred, we used a similarity measure to compare emotion categories. Specifically, we used cosine similarity motivated by Heylen et al. (2015), which provides a score indicating how similar the co-occurrence patterns of two emotion categories are, with higher scores indicating greater similarity. The emotion term pairs were then ranked according to their cosine similarity scores. Te reo Māori experts within the research team reviewed the highly similar pairs to determine whether the corresponding categories could reasonably be merged, considering the linguistic and cultural meanings of the terms.

Following this process, 30 emotion categories were identified. The categories merged as a result of this analysis are *mamae–sad–distraught, scared–āmaimai, hātakēhi–harikoa–ngahau, mimi i tana korowai–passionate*, and *pai–tau*.

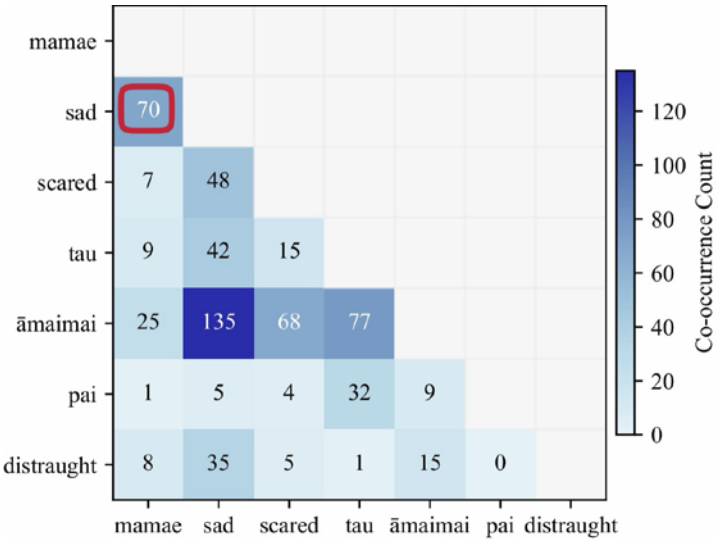

FIGURE 6 Co-occurrence matrix of six emotions

Final emotion categories

Te reo Māori experts in the team re-reviewed the remaining 30 emotion categories and grouped those that could be meaningfully combined, which resulted in the 16 distinct categories shown in Table 2. The experts assigned each category a name, as listed in the first column. The assigned name was chosen to represent all terms in the group, and ideally, it replaces most of them. Te reo Māori names were used where possible. Names such as *mimi i tana korowai* and *karakia,* suggested by focus group participants, were avoided because they did not clearly reflect the emotions within the category. Sub-rows in the table show how the original 40 categories were merged into the final 16.

Comparison with the focus group categories revealed that the participants already recognised that some of these categories are related because they used different shades of the same colour and spatial proximity. For example, *sad*, *grief*, and *distraught* all had different shades of blue in Figure 5, indicating perceived similarity. These were later grouped under *pōuri* by the research team.

Discussion

Comparison with presumptive universal emotions

When comparing the final 16 emotion categories with Ekman's six basic emotions, anger, disgust, fear, happiness, sadness, and surprise (Ekman, 1992), we found that Ekman's emotion categories were represented within te reo Māori emotion categories. For instance, *hōhā* corresponds to *anger*, *whakarihariha* to *disgust*, *āwangawanga* to *fear*, *harikoa* to *happiness*, *pōuri* to *sadness*, and *ohorere* to *surprise*.

Additionally, emotions such as *hīkaka* and *whakahīhī* can be related to excitement and pride, identified in an extended version of Ekman's model (Ekman, 1999). Moreover, *love* (aroha) and *tired* (ngenge) have also been referenced in well-known emotion studies (Ortony & Turner, 1990; Russell, 1980).

Other emotion categories we identified are not frequently discussed in Western emotion studies. However, we found them significant for Māori because they emerged from Māori community media and were identified and validated as distinct emotion categories through feedback from te reo Māori speakers.

Since the emotion categories in this study were derived from selected speech recordings from community media, some emotions may be absent simply because they did not appear in the recordings. However, given the focus on community media, we believe the study captures the most commonly expressed social emotion categories in te reo Māori speech. Accordingly, we refer to these categories as *common social emotion categories* rather than *basic emotions*.

Research directions

While some emotion categories identified in this study align with those of Pākehā, including Ekman's, the verbal expression of these emotions may differ between Māori and Pākehā speakers.

TABLE 2 Final emotion categories for te reo Māori speech

Category	Emotion terms
haumaru	comfortable, āhuru, welcoming, friendly, hoahoa, safe
	whakatenatena
hīkaka	passionate, wehi, ihiihi, wanawana, wana
	ngangahau, energetic, whitawhita, rere te mauri, hiamo, wairua kōhara, hīkaka, kamakama, enthusiastic, hīkakatanga, excited, mātātoa, eager, ngākau whiwhita, mimi i tana korowai
harikoa	gleeful, cheerful, ngahau, playful, enjoyment, manahau
	koa, harikoa, hākoakoa, koakoa, koangē, jovial, jolly, joyful, happy, hari, whakakoakoa
	light-hearted, amused, āhuareka, hangareka, hātakēhi
	waimarie, lucky
pai	ora, painga, pai
	reassured, relieved, māoriori, glad
	rangimārie, tau te manawa, at-ease, pārore, relaxed, calm, tau, noa, marino, neutral
kaikā	kaikā, impatient, tākare, tāwhetawheta
aroha	whakamana, respectful, earnest
	caring, aroha, love, compassionate
	karakia, whakawhetai, thankful, grateful, appreciation, ngākaunui, kaingākau, hopefulness
whakahīhī	poho kererū, whakatoi, confident, sarcastic, whakahīhī, convinced, ngākau titikaha, prideful
manawanui	determined, serious, whita
huakore	incredulous, exasperated, sceptical
	hopelessness, helpless, resigned
	cynical
ngenge	pau te hau, tired, ngenge
ohorere	mīharo, surprised, astounded, shocked, amazed, ohorere, stunned
whai whakaaro	curious, inquisitive
pōuri	grief, mate, sorrow, whakapoururu, whakamomori
	sad, upset, pōuri, pāpōuri, whakaaroha
	heartbroken, pāmamae, painful, mamae, hurt, taumaha
	desperate, despairing, distraught
	kaniawheatanga, regretful, disappointed, matekiri, sorry, apologetic, matangurunguru
hōhā	hōhā, hēmanawa, frustrated, tense, annoyed, stressed, pōrearea, fed up, whanowhanoā, kārangirangi
	riri, indignant, angry, disgruntled, pukuriri, aggrieved, aggressive, mauāhara, mad, takariri
	kino, kikino
	contemptuous, resentful, bitter, whakakaitoa, insulted, sour, offended, jealous
	wairua whakataetae, defensive, tāruke, pūtohe, argumentative, stroppy
	whakaparahako
āwangawanga	vulnerable, unsure, shyness, matawaenga, apprehensive, hesitant, uncertain
	māteatea, embarrassed, flustered, pōnānā
	pōhauhau, lost, kutekute, confused, kaumingomingo, pau te hinengaro
	whakawehi, afraid, intimidated, scared, tarawewehi, kōtore whererei, fear, mataku
	nervous, āmaimai, anxious, anipā, concerned, āwangawanga, mānukanuka, worried, pōraruraru, māharahara
whakarihariha	gross, whakarihariha, disgusted, dissatisfied, whakaahu

In the next step in the study, we will analyse these differences by recording an emotional speech database with Māori professional actors and conducting acoustic analysis of their speech. The long-term goal is to develop a computer model that categorises speech samples based on Māori emotion categories, supporting culturally sensitive emotion-based technologies. This objective is illustrated as the final stage of our research framework in Figure 1.

This study focused on emotions in speech, as the questionnaire participants identified emotions by listening to community media. Some participants noted difficulty recognising emotions without visual cues such as facial expressions. Future research on Māori emotions could explore emotions expressed through facial expressions and compare these with emotions conveyed in speech.

The current study analysed emotions expressed in Māori community media and therefore captures emotions primarily occurring in everyday social interactions across a range of contexts. Future research could investigate how emotions vary across specific Māori cultural contexts, such as wānanga, tangihanga, delivering or hearing a whaikōrero, haka, or karanga. Examining these contexts could provide insight into the influence of cultural and social settings on emotional understanding, contributing to a more comprehensive understanding of Māori emotional experiences.

This study used questionnaires and focus groups as Indigenous methodologies to identify emotions. Future studies could use interviews or ethnographic methods to explore emotions more deeply. Pihama et al. (2019) noted that whakataukī play an important role in understanding Māori emotions and could be analysed for further insights.

Broader impact

The emotion categories identified in this study can inform te reo Māori research in various fields, including psychology, linguistics, and emotion-based technology development. They can even serve as valuable educational material for teaching emotion categories to students at an early stage of learning. Additionally, synonyms or related terms identified through focus group discussions could be used as educational material to support vocabulary development and cultural understanding.

Using English emotion categories, such as Ekman's (1992) presumed universal emotions, or their direct translations may offer a quicker approach for emotion-based studies. However, as discussed above, cultural differences in emotional expression and the urge to decolonise research underscore the need for this kind of fundamental research. Our findings further support this need.

No pre-existing research method was suitable for our context, so we developed the methodology presented in this study from scratch. This approach was shaped by the specific requirements of our work and was informed by discussions within our transdisciplinary research group in response to emerging findings.

Other languages can benefit from this study in multiple ways. For languages similar to te reo Māori, the emotion framework we developed could serve as a starting point, with adaptations to reflect their unique linguistic and cultural contexts. For more distinct languages, our research methodology offers a replicable approach for developing culturally appropriate emotion frameworks. Additionally, this work enables comparative studies across languages and cultures, contributing to a cross-cultural understanding of emotions.

Conclusion

Emotion research often relies on presumed universal emotion categories derived from Western studies, overlooking how culture can shape emotional concepts. There is evidence that emotional expressions differ across cultures and that translation from one language to another may not fully capture the cultural and emotional nuances of emotion categories. This raises questions about whether presumed universal emotion categories are sufficient to represent the full range of emotional concepts across cultures. To address these gaps, this study presents a community-oriented approach to identifying common social emotion categories in te reo Māori speech. Through analysis of community media and feedback from te reo Māori speakers via questionnaires and the focus group discussions, we identified 16 culturally significant emotion categories not fully captured by presumptive universal emotions. These findings support the argument that culture shapes emotion categorisation and highlight the limitations of presumed universality. The framework established here can guide other Indigenous communities in identifying culturally relevant emotion categories. The 16 emotion categories identified in this study could be used in many applications, including enhancing emotional well-being, psychological research, education, and technological development.

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Ethical considerations

Ethics approval was obtained from the University of Auckland Human Participants Ethics Committee on 26 May 2023 for three years (Ref No. 25611).

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Glossary

āhuareka	pleasant; entertaining; amused
āhuru	comfortable
āmaimai	anxiety, nervous
anipā	nervous; apprehensive; uneasy
Aotearoa	New Zealand
aroha	love
ate	liver
āwangawanga	worry; anxious
hae	jealous
hākoakoa	happy
hangareka	funny; amused
hari	happy, happiness
harikoa	happy
hātakēhi	hardcase; funny; amusing
haumaru	safe

hēmanawa	breathless; flustered; exasperated
hiamo	excited
hīkaka	excited
hikakatanga	excitement; eagerness
hoahoa	friendly; amiable
hōhā	annoyed; boring; exasperated
huakore	hopeless; helpless
ihi	psychic force
ihiihi	excited; thrilled; terrified
kaikā	be eager; impatient
kaingākau	to prize greatly; value
kamakama	eager; keen; nimble
kaniawheatanga	remorse
karakia	ritual chants
karanga	ceremonial call
kārangirangi	irritated; unsettled; disillusioned
kare ā-roto	emotions
kaumingomingo	confused; disordered; chaotic
kikino	evil; bad
kino	bad; hate
koa	elated, happy, delighted
koakoa	elated; happy; delighted
koangē	happy
kōtore whererei	to be fearful; terrified; afraid; scared; frightened
kutekute	confused
māharahara	worried, anxious, preoccupied, apprehensive
mamae	pain
manahau	elated; cheerful
manawanui	serious; patient
manawapā	reluctant
māngere	lazy
mānukanuka	anxiety; misgiving; apprehension
Māori	Indigenous peoples of New Zealand
māoriori	at ease; content; untroubled
mārie	peaceful
marino	calm; tranquil
mataku	scared
matangurunguru	numb; discontented; disappointed
mātātoa	fearless; undaunted
matawaenga	undecided; ambivalent
mate	misfortune; problem; defect
māteatea	ignominious; humiliating; shameful
matekiri	frustrated; disillusioned
mauāhara	ill feelings; animosity; loathe; hate
mīharo	amazing
mimi i tana korowai	excited
ngahau	enjoyable; entertaining
ngākau	heart
ngākaunui	be eager; enthusiastic
ngākau titikaha	confident
ngākau whiwhita	to be eager; keen
ngangahau	active; spirited
ngenge	tired, weary
noa	neutral
ohorere	surprised
ora	well
pai	good, fine, okay
painga	good; well-being
Pākehā	European
pāmamae	hurt; pain; upset
pāpōuri	sad
pārore	relaxed
pau te hau	tired
pau te hinengaro	lost
pōhauhau	confused; indecisive; uncertain
poho kererū	to be proud
pōnānā	anxious; too eager; hasty
pōrarurarū	confused; bothered; stressed
pōrearea	annoyed; bothered
poroporoaki	farewell
pōuri	sad
pūhaehae	jealous
puku	stomach
pukuriri	angry
pūtohe	persistent; eager; determined
rangimārie	quiet; peaceful
rangirua	confused
rere te mauri	busy
riri	angry, anger
taiatea	nervous
tākare	impatient; exuberant; enthusiastic
takariri	be indignant; incensed; angry
tangihanga	funeral
tarawewehi	to be terrified; scared to death; frightened
tāruke	impatient

tau	to be settled
taumaha	heavy; very ill
tau te manawa	calm
tāwhetawheta	eager
te ao Māori	Māori world; Māori worldview
te reo Māori	the Māori language
toa	brave
waimarie	lucky
wairua kōhara	enthusiastic
wairua whakataetae	competitive
wana	exciting; thrilling
wānanga	seminar
wanawana	thrilling
wehi	to be awesome; afraid; fear
wene	jealous
whaikōrero	formal speech
whai whakaaro	curious
whakaahu	displeased; disgruntled; dissatisfied
whakaaroha	sad
whakahau	encouragement
whakahīhī	proud
whakakaitoa	vengeful; unforgiving
whakakoakoa	cheerful; jolly; joyful
whakamā	shy; embarrassed, ashamed
whakamana	validated; empowered
whakamomori	desperate; stressed out
whakaparahako	insulting; offensive
whakapoururu	sombre; sorrowful
whakarihariha	disgusting
whakataukī	proverbs
whakatenatena	encouraging
whakatoi	cheeky; mischievous
whakawehi	terrifying; frightening; threatening
whakawhetai	thankful; grateful
whanowhanoā	to be annoyed; irritated; exasperated
whita	firm
whitawhita	eager

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