COVID-19 in the South Pacific: science communication, Facebook and 'coconut wireless'

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Abstract

The onset of the COVID-19 pandemic has highlighted the criticality of science communication. Utilising a mixed-methods approach, this article takes an audience-focused perspective to analysing COVID-19 related social media posts on 23 popular South Pacific community Facebook pages over a four-month period across eight South Pacific countries. We analyse how audiences co-opt scientific terms, address information gaps and embed it in their lived experience. It is ascertained that online conversations around COVID-19 in the Pacific are intermeshed with both scientific fact and, personal accounts and rumours, referred to locally as 'coconut wireless', problematising established modes of empirical enquiry.

Introduction

This article seeks to explore how online audiences in the South Pacific understand, appropriate and rationalise COVID-19 related scientific terms across 23 mainstream Facebook groups from the 1st of February to 31st of May, 2020. Given Facebook's high penetration and usage rate in the Pacific, the platform serves as an active space for information exchange and deliberation around COVID-19. We start by mapping trends in the usage frequency of COVID-19 terms and associated scientific terminology in Facebook discussions during the analysis period. Subsequently, we analyse the social media conversations related to the most frequently referenced COVID-19 scientific terms utilised by Facebook users in the region, with a focus on how these conversations are being operationalised in the Pacific context.

We argue that global mainstream concepts such as 'social-distancing', 'isolation' and 'quarantine' assume culturally specific meanings and attract unique interpretations and assumptions, which at times obscure and alter their original meaning. More broadly, it is ascertained that online conversations around COVID-19 in the Pacific are intermeshed with both scientific fact and personal

accounts and rumours, referred to locally as 'coconut wireless'. An audience-centred analysis of online science communication provides communication practitioners with a viable roadmap to tailor their communication strategies to consider how audiences process scientific information, critically assess media sources and resolve (or sometimes unwittingly exacerbate) instances of confusion through active discussion.

Context

COVID-19 has been identified as a global risk in which countries are "prioritising people's health over economy" [Kickbusch et al., 2020]. However, the pandemic impacts and responses vary by country and by states within countries. As of June 2020, United States has been most severely impacted followed by Russia, Brazil, India and United Kingdom accounting for close to 50% of all confirmed cases worldwide [Johns Hopkins University of Medicine, 2020]. The G20 countries have called for global cooperation to address the pandemic [Kickbusch et al., 2020]. China has managed to flatten the curve with "strong governance, strict regulation, strong community vigilance and citizen participation, and wise use of big data and digital technologies" [Hua and Shaw, 2020]. Viet Nam, despite its geographic proximity to China, contained the spread of COVID-19 at early stages with few reported cases through an effective policy response and utilising social media and science journalism for timely communication [La et al., 2020]. Although many Pacific nations remain COVID-free, there are fears of COVID-19 importation into the region through air travel [Craig, Heywood and Hall, 2020]. There are concerns that if the virus reaches their shores, it is likely to overwhelm the limited health infrastructure and services available within the island nations [Doherty, 2020].

In times of crisis like a pandemic, "fear and outrage are the most contagious" [Llewellyn, 2020]. Science communication can help overcome such fear by providing a link to reliable and credible scientific information including health risks and benefits of prevention or treatment to general public [Weingart and Guenther, 2016]. While prevention guidelines were issued by various institutions, "trust in science and COVID-19 risk perceptions both independently predict individual compliance with COVID-19 prevention guidelines" [Plohl and Musil, 2020]. Also, higher political conservatism, religious orthodoxy, conspiracy ideation and lower intellectual curiosity result in lower trust in science and thereby lower compliance with prevention guidelines (ibid). This highlights the importance of trust in science to ensure compliance with COVID-19 prevention guidelines.

Scientists and medical doctors are considered trusted sources of information for science communication, though their institutional affiliations or special interests (industry linkages vs academia) may impact the level of trust [Weingart and Guenther, 2016]. However, trust and credibility including trust in science or scientific knowledge is not completely independent of the social context and is derivative of trust in institutions, social relations and identity-negotiation among other factors [Wynne, 1992]. The social context of science communication highlights a need for reflexivity, responsiveness and understanding of audience (end-user) information needs, and their communication practices as they engage with scientific information — as is the case with COVID-19 communication and prevention guidelines. Social media intelligence can be an important resource to understand user needs, their practices and enhance trust in public health measures [Depoux et al., 2020].

Social networks act as an amplifier for both harmful and beneficial behaviours [Van Bavel et al., 2020]. Group identity and affiliation can impact the acceptance of scientific information including information shared on social media. Individuals get their information through interpersonal communication, whether through word of mouth or mediated and their group identit(y)/ies and affiliations can impact acceptability of scientific information. Science communication and scientific information can become more acceptable if it is not presented as a choice "between knowing what's known by science and being who they are as members of diverse cultural communities" [Kahan, 2015]. It is worth noting that this has implications for COVID-19 communication particularly in countries where oral cultures are dominant, collectivism is valued and mediatisation and engagement on social networking sites has accelerated due to physical distancing or quarantine requirements. Physical distancing is considered one of the key strategies for slowing the spread of pandemic but can result in loneliness and greater need for connection. While online interactions can help with building connections, passive social media use may not be beneficial in this regard [Van Bavel et al., 2020].

Social media presents a few major challenges for science communication. Firstly, the lack of fact checking and trusted gatekeepers on social media makes it challenging to distinguish fact from opinion. Social media is open to manipulation and subjective opinions and interpretations where "the true, the false and the fallacious simultaneously coexist" with few checks or balances giving rise to disinformation and fake news and extremist views online [Schiele, 2020]. Fake news, misinformation and conspiracy theories have been rampant on social media since the start of COVID-19 pandemic. Fact-checking and debunking myths and misinformation have been embraced by a range of organisations, but their impact remains limited considering the scale and range of misinformation [Van Bavel et al., 2020]. Social media acts as a vector for conspiracy theories. The sharing of misinformation and conspiracy theories on social media presents a public health risk during the COVID-19 pandemic [Allington et al., 2020].

Secondly, the 'echo chambers' on social media can be detrimental to critical thinking amongst its users [Weingart and Guenther, 2016]. Social media algorithms favour shocking or emotionally charged content which results in high engagement irrespective of its factual accuracy [Garza, 2020].

Thirdly, the process of shifting audience norms and group behaviour in times of a pandemic requires a focus on trusted sources of information, motivators, social norms, and values [Van Bavel et al., 2020].

Social media, specifically Facebook, has emerged as a key platform in South Pacific countries over the last decade. This is evidenced through increasing penetration of mobile phones and mobile internet usage. In Fiji, Facebook continues to be most popular social networking site that is playing a key role in elections, disaster resilience and connections with diaspora [Tarai, 2019] [Möller, Wang and Nguyen, 2018] [Howard, 2019]. In Solomon Islands and Vanuatu, Facebook groups like *Forum Solomon Islands International* and *Yumi Tok Tok Stret* respectively are providing a platform for discussion on issues ranging from politics and leadership to education and gender equality [Aqorau, 2017] [Brimacombe, 2016]. In Samoa, Facebook has been identified as an important platform for distribution of early warning and recovery messages in case of disasters [Mow et al., 2017]. In Tonga,

Facebook usage was used as an index of 'e-readiness for e-learning' [Sopu, Chisaki and Usagawa, 2016]. However, it is worth noting that the uptake of social media is skewed towards urban centres in most countries and access and bandwidth issues can still be a challenge in the region as in the case of Niue which offers free public Wi-Fi to its citizens but "struggles to keep up with growing demand" [Anayo and Horst, 2016].

The COVID-19 pandemic has resulted in an upsurge of related discussions on Facebook in the region. The initial response to the 'infodemic' around prevention guidelines has been followed by increasing concerns about the social and economic impacts of COVID-19 [ABC International Development, 2020]. Willans describes social media as a "new mediated think tank" for democratic debate as she reflected on language-in-education policy changes in Vanuatu [Willans, 2017]. We consider Facebook to be a key medium of public debate across the region that can provide us with insights on quantitative and qualitative usage trends of scientific information and greater context around the localisation of COVID-19 discourse in the South Pacific.

Objectives This paper has three research objectives:

- To present a quantitative mapping of trends in usage frequency of COVID-19 scientific terms in social media conversations

- To conduct an in-depth qualitative exploration of these social media conversations within their broader embedded contexts

- To present an account of how these conversations are operationalised and adapted to the Pacific context

Our research objectives broadly draw on a range of recommendations from existing literature to enhance understandings of COVID-19 communication. These are listed below:

- The first objective considers a holistic evaluation of practice(s) in science communication "to explore use of longitudinal data that can analyse trends on journalistic articles, social media outlets or blogs" [Brüggemann, Lörcher and Walter, 2020]. This involves examining emerging trends within Facebook communities in the South Pacific, as they "talk about science" [Bucchi and Trench, 2014, p. 10] relating to COVID-19.

- The second objective draws on the need to understand "the psychology of social media" [Llewellyn, 2020]. Sharing content on social media can be often driven with "a desire to protect our loved ones". As highlighted by Garfin et al, use of social media for effective risk and science communication during a public health crisis needs further research [Garfin, Silver and Holman, 2020]. There is significant value in systematically investigating how scientific terms are contextualised and user motivations for sharing the information on social media.

– The third objective focusses on understanding the Pacific context as a collectivist oral culture utilising behavioural and social practices, that can play a critical role in informing measures for prevention and containment of the pandemic [Van Bavel et al., 2020]. This involves exploring if there are peculiarities around social media engagement that play out in predominantly oral Pacific cultures, with a broader view of ascertaining how word-of-mouth or interpersonal communication evolve online.

Methods

To address the research objectives, this paper provides an in-depth analysis of a sample of 23 active public online Facebook communities across eight countries in the South Pacific from 1st of February to 31st May 2020. Please note the term user/s and audience/s are used interchangeably across the paper to refer to those posting or commenting about COVID-19 on selected public Facebook groups.

The methods section provides (a) the rationale for using Facebook as the preferred social media platform for analysis, (b) a selection of COVID-19 scientific terms, (c) the sampling and analysis approach undertaken and (d) limitations of the study.

Table 1 provides the details of social media penetration in the eight countries for four different platforms (Facebook, Instagram, Twitter and Linkedin). Facebook clearly dominates the social media landscape and was chosen as the preferred platform based on the data compilation of advertising audiences from We are Social [Hootsuite: we are social, 2019]. Facebook is the most popular social media platform in the South Pacific with more than 90% (advertising) audiences among all internet users in all eight countries included in the analysis except Samoa.

Table 1. Social Media Platforms across eight Pacific countries.

	Population	Internet users	Facebook	Instagram	Twitter	Linkedin	Updated
Fiji	915.5	550	540	110	20	130	Jan-19
Vanuatu	303.5	95	92	4	3.6	15	Jan-20
Tonga	109.5	66	66	6.6	0.8	11	Jan-19
Solomon Is.	629.3	88	87	4.5	1.2	14	Jan-19
Samoa	198.3	100	66	8.2	3.2	11	Jan-19
Palau	22.1	14	13	3.4	1.6	5.7	Jan-19
Kiribati	118.5	43	42	0.7	0.8	8.3	Jan-20
Niue	1.6	1.3	No data available				Jan-20
Total	2298.3	957.28	906	137.4	31.2	195	
All figures in 000s							

The Yale COVID-19 Glossary was used as a reference to inform this part of the analysis [Katella, 2020].[1] This analysis will reflect on specific scientific terms and their context of usage in the entire corpus of sampled text.

A customised Python program was written to perform the following functions: (1) identify specific HTML tags in the source of Facebook pages relating to posts and

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[1]The Yale COVID-19 Glossary is an initiative by the Yale Medicine research facility and part of Yale University's broader Research, Clinical and Data Driven Response Program to COVID-19.

user comments and (2) scrape all posted content under relevant HTML tags on the sampled Facebook pages. As a form of data triangulation, ParseHub was used to ensure scraping accuracy. ParseHub is a data-extraction tool that allows users to scrape the content of multiple webpages through the convenience of a graphical user interface. ParseHub drew an identical volume of data (3436 COVID-19 related posts) to the Python program affirming that all relevant COVID-19 posts were being included in the analysis. The use of ParseHub as a tool for triangulation has been effectively used in Jezierski's [2020] study on validating key themes in the responses of hoteliers to customer reviews. While the subject matter of the study differs from the content of this paper, it provides an elegant methodological example of how ParseHub can be applied to validate the scope and size of a data set to ensure the inclusion of all relevant data in the analysis.

A purposive sampling method was utilised to include the most reached Facebook pages in each Pacific country so that the data collected would be closely reflective of mainstream regional online public sentiment at the time of analysis. This purposive approach to sampling Facebook groups was inspired by a recent Facebook content analysis project by Stellefson et al. [2019] on how Facebook conversations facilitate diabetes self-management support and communication around the medical science of diabetes. The authors selected the 50 largest public diabetes-related Facebook groups based on overall number of members, reach and engagement, with the aim of capturing a strong representative sample of how diabetes is communicated on social media. Utilising a similar purposive philosophy around sampling representation, Facebook pages with the highest reach for each country were filtered for this study using The Socialbakers 2020 report [Socialbakers, 2020]. 3436 Facebook posts and their respective audience comments were analysed from the entire sample.

Table 2. Sample breakdown of Facebook groups.

Vanuatu	Fiji	Tonga	Solomon Islands	Samoa	Palau	Niue	Kiribati
Yumi Tok Tok Stret and Yumi Tok Stret (News)	Fijian Made	Tonga News Hub	Solomon Star	Samoa Mo Samoa	Pacific Note	Niue Foou Hospital	Humans of Kiribati
Wan Smalbag	Fiji Village	Must be Tongans	Solomon Islands Broadcasting Corporation	Samoa Observer	Island Times	Office of the Scretary	Radio Kiribati
Vanuatu Dialogue Live	Fiji One News	Loop Tonga	Today Solomons	Loop Samoa	Office of the President, Palau	Broadcasting Corporation of Niue	

A discourse-oriented strategy, Connected Concept Analysis (CCA), was utilised for the analysis. CCA is a method based on grounded theory that generates particular 'categories' or interpretations of social reality that are indicated by the data collected on a given research phenomenon. The identification of these categories involves examining the wider context of each word and then grouping together words that have a similar context. To assess whether words are used in similar contexts, a specific set of criteria provided by Van Dijk [2008] is employed when

determining the similarity of meaning between different contexts. Variables assessed to determine contextual similarity include 'agency' (the underlying beliefs and principles audiences hold), 'modality' (the tone in which a discourse is conveyed, such as its emphasis on necessity, probability, possibility), 'granularity' (variations in the level of description of a particular event), 'topic' (the central issue being addressed) and 'time' (when a post was published). Categories (interchangeably referred to as themes) are then sorted by their level of prominence in a particular corpus of text by quantitatively identifying how frequently they appear [Pillay, 2019].

This paper uncovers latent social categories that may be present in sampled Facebook posts with the aim of explaining how its online audiences discuss issues relating to COVID-19, including the way science information is integrated into these narratives. The successful application of CCA to online audience-generated texts is apparent in Lindgren's [2011; 2019] research into online social media discussions on Swedish movie piracy and also in his work on analysing Twitter participation by members of WikiLeaks. Lindgren also employed a variant of the CCA model in his more recent work on understanding mental health discourse and terminology in online social video fandom discussions [Lindgren, 2019].

In terms of data-management, data gathered from the Facebook pages were automatically stored in a common independent .txt file. The data file is then run through a customised concordance software to determine the most frequently occurring words in the entire corpus together with their respective contexts of usage (also known as discourse atomisation). Words that were used in similar contexts were grouped together to form key themes. To assess whether words are used in similar contexts, a specific set of criteria provided by Van Dijk [2008], as explained before, was employed when determining the similarity of meaning between different contexts.

As key themes began to emerge from the analysis, a tagging process was concurrently undertaken with NVivo 12, as a way of classifying specific snippets of data (direct quotes from posts) into defined nodes. Each node represented a specific theme (see appendix A for Node map). A coding book was not utilised due to the iterative nature of the analysis, requiring thematic definitions to be developed (and its conceptual perimeters drawn) during the analysis itself.

There were a few limitations to this study:

- Given the limited sample of Facebook groups analysed (based on reach), the findings should not be generalised as reflective of overall South Pacific sentiment towards COVID-19

- Only English Facebook groups and posts were analysed due to availability of resources at the time of writing

- The analysis was conducted at a regional level so country-specific trends may differ based on respective local contexts

- There is a high volatility in the main themes of discussion over the analysis period so consistent themes over the four-month period are hard to establish

– The study focuses on audience/ user centred analysis and is not an analysis of practitioners or scientists working in the field of science communication or science journalism

Results

The results are shared in three main sections based on the research objectives. These are detailed below:

1. Mapping of trends in usage frequency of COVID-19 scientific terms. The following graph (Figure 1) provides a quantitative trend line tracking the number of instances COVID-19 scientific terms (from the glossary provided by Yale Medicine) were referenced in the data sample of Facebook conversations, throughout the analysis period from 1st February to 31st May 2020. It should be noted that subsequent discussion on the trends in usage of scientific terms provide contextual insight to these engagement patterns rather than definitive attributions. It is also worth noting that a severe tropical cyclone, Cyclone Harold, hit the South Pacific from the 1st to 11th of April, causing widespread infrastructural destruction in the Solomon Islands, Vanuatu, Fiji and Tonga. Given the scale of the natural disaster, online conversations on COVID-19 may have assumed secondary significance during that period.
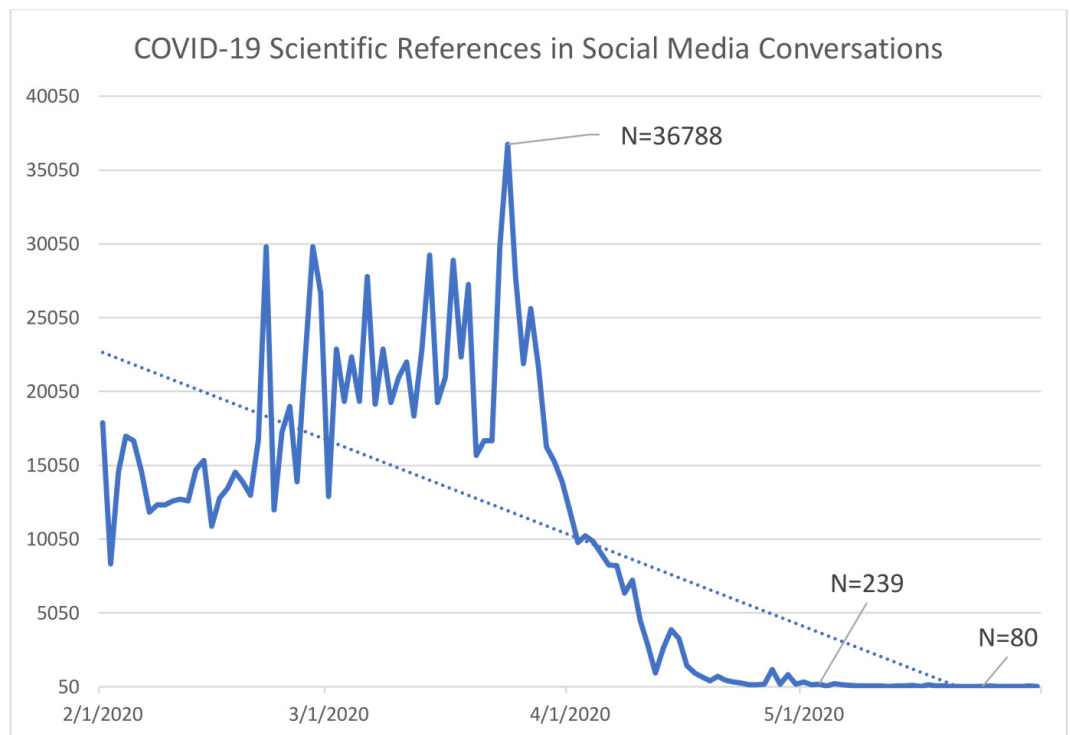

Figure 1. COVID-19 scientific references in sampled social media conversations.

The numerical range on the Y-Axis scale in Figure 1 has been adjusted to reflect the lowest relevant range in accordance to the number of scientific references during the analysis period, which is N=50. The first substantial peak in references to COVID-19 scientific terms occurred on the 22nd of February; there was a 66% increase from the start of the analysis period. An examination of the raw data showed that a substantial amount of these references stemmed from the sharing of

quotations and excerpts in international news stories most notably from the Australian Broadcasting Corporation (ABC), New Zealand Herald, The Seattle Times and New York Times. All of the referenced stories shared a common focus around the surge in Coronavirus cases outside of China, including South Korea, Iran and Italy. The following quotes in response to these shared stories were pulled from the data on the 22nd of February.

> *"This can't be happening. COVID-19 cases outside China now. Surely it won't come to our beautiful kingdom? Spreads easily though."*
>
> *"We are blessed to be in God's paradise. Will pray the rest of the world get through this (sic)."*
>
> *"Cases going up. Epidemic clusters outside China!"*

The consistent fluctuations in March around the frequency of science related discussion on COVID-19 seem to be consistent with broader regional uncertainty around imposed lockdowns including restrictions on social/physical distancing measures in public spaces. 62% of posts (and associated comments) from March around COVID-19 featured questions around social/physical distancing measures. References to scientific words inevitably rose at the time when these questions were posed and would subsequently fall until the next question surfaced on Facebook.

Towards the end of March, a qualitative examination of the raw data reveals that the sharp peak in references (N= 36,788, Figure 1) was primarily skewed towards online discussions in Fiji over published media reports announcing the first cases of local transmission in Fiji. These stories sparked considerable debate across the Facebook pages of mainstream Fijian media outlets. The most frequently used COVID-19 terms during the day of the actual peak (24th March), were "COVID-19" and "Outbreak". The onset of Cyclone Harold from the 1st of April coincided with a dramatic decline in scientific references, with a majority of posts on social media pages (outside the scope of our analysis sample) featuring regular real-time updates from national meteorological services on the trajectory of the cyclone. With states of emergency regulations and containment procedures in place across multiple countries in the South Pacific, there was also the possibility that certain scientific terms around COVID-19 were somewhat normalised and culturally co-opted thus resulting in less overall social media coverage.

In addition to the above, there was also a general region-wide decline in the sharing of official public health information/messaging on COVID-19 from respective national government and health ministry Facebook pages. In its place, were broader reflections/discussions on the economic ramifications of COVID-19 in the tourism and agricultural sectors, an area of discourse that was dominated by small-to-medium business owners and hoteliers focusing on declining revenue streams and national financial relief incentives. The quotes below encapsulate presiding sentiments during that time.

> *"Cyclone and COVID. Our economy is bleeding. No international travel means only domestic visitors. How to survive?"*
>
> *"Incentive to do what? Government give us money (sic) but serious rebuilding work required (needing more $$$) to even think about starting my farm up again…"*

2. Explore and understand the social media conversations related to COVID-19 scientific terms. From a qualitative audience-centred viewpoint, it is imperative to understand how Facebook participants are grappling with, and adapting to, standardised mainstream scientific terminology around COVID-19. As non-scientific practitioners ourselves, we will not be commenting on the accuracy of scientific interpretations by the online South Pacific community, but rather on how communication and information flows are re-configured in very particular and interesting contextual ways to facilitate and/or reinforce specific socio-cultural beliefs and mindsets. Subsequently we argue that these patterned ways of understanding scientific terminology provides a useful blueprint for scientists and science communication practitioners to navigate science communication process [Bucchi and Trench, 2014, p. 9]. This involves an acknowledgement that the cultural reception of science communication is not as a passive process but an evolving set of active practices to contextualise science.

In an attempt to capture the socio-cultural integration of scientific terms around COVID-19 in the South Pacific, we extracted the top 10 most utilised terms (across the analysis period) and classified them based on contextual similarities, into 6 broader themes. The weighted frequency of representation in Table 3 indicates, as a percentage, how representative a particular theme is based on the number of times it appeared in the corpus. The base value (100%) was set to the overall number of times all 6 themes appeared in the corpus.

Table 3. COVID-19 terminology in dataset and associated thematic area.

Rank	Words(s)	Weighted frequency of representation (%)	Thematic context in which words were most frequently used
1	'Outbreak', 'Quarantine' 'Isolation'	38%	Overseas visitors and returning residents to Pacific Island states and a focus on closing national borders
2	'Coronavirus' 'Vaccine'	23%	Vaccine development and the global discovery of a cure
3	'PPE'	19%	Masks delivered by China into the Pacific as part of China's global relief strategy
5	'Hygiene' 'Wash'	15%	Institutional messages around proper handwashing
6	'Testing' 'Self-monitoring'	5%	Questions on social distancing/ physical distancing in public spaces

'Outbreak' 'quarantine' 'isolation'

Considering the low-rate of reported COVID-19 cases in the South Pacific (at the time of writing), online discussions were framed around government efforts in preventing transmission from overseas visitors and returning residents, including repatriated workers from Australia and New Zealand. There was considerably granular focus by audiences on issues relating to the proper sterilisation of transport and hotel accommodation, upon the return of overseas residents. These discussions were often predicated on assumptions about the survivability and transmissibility of the virus in different climatic conditions. In addition, there was

substantial commentary on the differences in meaning between quarantine and isolation, with many suggesting that quarantining overseas arrivals (relative to isolation measures) would still open possibilities for local transmission. On the contrary there were arguments erroneously affirming that both concepts shared identical meanings.

These pockets of conversation were typically part of a larger stream of Facebook comments to posts on COVID-19, leading to multiple instances of misinformation both on the epidemiology of viral infections and national policy details to contain transmission. Included below are quotes from the data collected showing examples of how these discussions transpired on Facebook.

> "…we have to ensure the bus seats and rails are sterilized, don't wan (sic) people touching everywhere…this is outbreak heaven. Virus like these often multiply in enclosed space (sic)"

> "virus cannot live on slippery surfaces don't worry bro no outbreak"

> "no, no, no, overseas returns must be isolated NOT quarantined. If they go to shops there is still a chance to come in contact with others. Vanuatu needs to be resilient…"

> "…all this talk on quarantine, isolation when they both mean the same thing. Staying indoors. No difference. Gosh seriously people, get a grip. We have enough issues to think about… Fiji PM already said it's under control."

'Coronavirus' 'vaccine'

February and March saw the emergence of multiple online video snippets claiming the discovery of new vaccines to cure COVID-19. These videos were produced from unverified international sources often with claimed affiliations to specific universities and research labs. They received considerable traction on Facebook. The majority of responses (80% of instances where this theme arose) were supportive (rather than critical) of these unverified discoveries (see quotes below), further validating the presiding challenges of disinformation on social media networks and the susceptibility of online media communities to the spread of false information.

> "4-hour coronavirus vaccine discovery? True or not?"

> "God is great. We have a cure!"

> "is this coronavirus vaccine available yet?"

> "going to be expansive(sic) and further debt here for our country when they sell us the vaccine"

'PPE'

PPE (Personal Protective Equipment) was frequently used to refer to the regional COVID-19 relief aid provided by China to the Pacific region, most notably in the form of face masks. Online discussions were based on the geo-political implication(s) of receiving Chinese aid and the potential impact of these aid streams in furthering Chinese economic dominance across the region. The importance of personal protective equipment including how to use it and its role in

critical health care settings during the pandemic were typically not raised and/or addressed with the same level of frequency by Facebook users. The quotes below from Facebook conversations on PPE further emphasise the trajectory most discussions on this topic took.

> "First PPE, then China take over our buildings and banks"
>
> "Can't trust this PPE gift as it comes with conditions attach(sic)"
>
> "China caused COVID-19 so now they trying to help us with PPE. We have no choice but to accept"
>
> "Are the gift of these masks and PPE an attempt at influencing our healthcare?"

Prevailing discussions of PPE as a topic of geo-political significance in our sampled data underlines a key example of how scientific terms and phrases are co-opted and discussed to achieve an independent symbolic significance, surpassing its original meaning.

'Hygiene' 'wash'

The sharing of institutional public information campaigns on media Facebook pages were the main avenues responsible for fostering discussion around the importance of maintaining everyday hygiene in light of COVID-19. The Ministry of Health Services in Fiji for example, with endorsement from the World Health Organisation (WHO), outlined a series of actionable steps to reduce the risk of COVID-19 infection. These steps were subsequently shared by national media outlets such as the Fiji Sun and Fiji Times in the form of infographics. Much of the discussion around institutional public health messaging involved appeals to fellow citizens to take heed of the advice, as evidenced by the quotes below.

> "Easy formula to follow on hygiene. Wash your hands regularly and don't touch your face. Not that hard right? "
>
> "Thank you MOH Vanuatu for this. People need to follow and practice. Please get this out to more pages."

'Self-monitoring' 'testing'

The concepts of self-monitoring and testing gained resonance in discussions on the need for street vendors and patrons to abide by social distancing guidelines and to stay home and get tested if they feel unwell. These sentiments were raised in response to media reports in early February on the uncertainty faced by several market vendors on social distancing guidelines particularly regarding the number of patrons allowed into their shop and permitted opening times.

> "Please get tested if you are not feeling well. Don't stay open for money. Malo aupit'o."
>
> "…not clear how many people allowed in shops. They say 10 people but will people check and count? Just need to self-monitor my staff if they develop symptoms."
>
> "how accurate are these COVID-19 tests? Can't everyone get tested at entrance of shops?"
>
> "Even if I get tested positive, I know that closing my shop is a death sentence"

The vast informal economy (independent proprietors in markets) in the Pacific poses serious and unique challenges to how monitoring and testing are carried out in line with prescribed social distancing guidelines. Street and market vendors play a critical role in ensuring urban food security as they offer low cost food alternatives to urban residents and other associated services. Communicating the significance of self-monitoring and testing to those whose livelihoods could be severely impacted by a positive result, poses its own challenges, especially in countries like Fiji where there was a high probability for disruption to businesses and agricultural farms in areas with confirmed COVID-19 cases.

There were also instances where a lack of consistency and clarity in the use of public health communication terminology led to confusion on Facebook. The interchangeability of use between the terms 'social distancing' and 'physical distancing' in public health messaging generated confusion, with users posting questioning their inherent differences in meaning.

> "I don't think I will social distance (sic). I will physical distance (sic), but I cannot not (sic) socialise at all…I run a hospitality business. I will get tested for COVID to be safe."
>
> "I think physical distancing is needed more than social distancing…for people not tested yet"
>
> "Oi…social distancing and physical distancing the same…"

It was clear from our analysis that the planning and implementation of effective science communication around COVID-19 requires both (a) an informed sensitivity to cultural contexts (e.g. food security challenges when local markets are inaccessible due to COVID-19 guidelines) and (b) a commitment to using consistent terminology in public health messaging. In regard to the latter point, the global mainstreaming of terms such as 'social distancing' both by the WHO and international and local media as part of common parlance, makes reverting to an alternative term particularly challenging for communication practitioners and one that requires prior consideration at a national level by key stakeholders.

Contextualising social media conversations — 'Coconut Wireless Trail' and the impact of the interpersonal on science communication

The 'coconut wireless' is an informal phrase/slang that has a historical sense of playful notoriety in the Pacific [Harris, 2004] as a way of referring to the centrality of 'word-of-mouth' (or interpersonal) accounts in the dissemination and discussion of news and rumours. The phrase was used consistently in discussions on COVID-19 (under the sampled analysis period) to (a) flag presumed factual inconsistencies, (b) to clarify the authenticity of a story where news sources are not clearly defined.

The Table below (Table 4) details most frequent audience driven appropriations of the phrase 'coconut wireless' across the 4-month analysis period. It should be noted that these appropriations/themes did not exist in isolation at any one period in time but rather the frequency of its usage peaked at specific moments. The phrase was used a total of 639 times across 18 Facebook pages. 98% of references to

'coconut wireless' comprised of users commenting in response to published stories on Facebook whilst the remaining references were from page administrators. The number of references to 'coconut wireless' under each theme is denoted in brackets.

Table 4. Timeline showing peaks in the thematic use of 'coconut wireless'.

Month	Peak theme and number of references (N=)	Context
February	Vaccination discoveries (N=186)	Posts responding to COVID-19 vaccine rumours
March	Social-distancing rules (N=136)	Self-prescribed limits on the number of people allowed in public spaces
May	Returning citizens (N=172)	Eye-witness observations of repatriated citizens

As asserted in the previous section, the prominence of disinformation on international COVID-19 vaccine discoveries received considerable traction on social media through the Facebook pages of Pacific media organisations. These stories were subsequently shared or re-posted on Facebook news pages with users either (a) dismissing the validity of these stories as "coconut wireless news" due to a lack of substantiated facts or (b) reinforcing their validity by claiming they heard it through the "coconut wireless" (word-of-mouth).

It is worth noting the dual function of "coconut wireless" as a term to both refute and reinforce the validity of specific news stories. The underlying fact remains that both these assertions were not made through any form of identifiable systematic inquiry (scientific or otherwise). The lack of consistent intervention by page moderators to address confusion with accredited scientific evidence perpetuated further speculation and debate on the veracity of these vaccine claims, as indicated in an excerpt from a local media Facebook page conversation.

> "…my friends couson (sic) in Texas is working on this vaccine and its all ready to go. I heard from coconut wireless. Vanuatu saves the world"
>
> "yu go hum (sic). Coconut wireless not for this page. We want real news. People are dying"
>
> "I saying (sic) from first-hand. I know cure will come and a Vanuatu scientist is working on this in America"
>
> "Wait…so this vaccine true or false?"

As mentioned in the previous section, there was widespread lack of clarity around prescribed crowd limits in public spaces across the region, especially in local markets. While the uncertainty around social distancing has become somewhat of a global challenge, this sense of ambiguity created a vacuum of credible information from relevant authorities, which was often filled by word-of-mouth accounts. For example, there were multiple posts prescribing self-imposed limits on the number of people that were permitted in a public setting — these speculations were sometimes dismissed as news from 'coconut wireless' (word-of-mouth) but not always.

> "what you saw at the school is ok. 5 people together is fine because the chance of catching COVID (sic) is minimal. 10 maybe is too much (sic)"
>
> "…all this is coconut wireless Nobody knows how this virus behaves…"

Towards the end of May, there were a substantial number of stories on citizen repatriation, with Pacific islanders returning home from (overseas) COVID-19 affected countries. Whilst, there were no official government announcements on the issue at the time, photos of filled vans and busses were presented on news media pages (most notably in Vanuatu and Tonga), framed as evidence of a covert repatriation process. These images sparked considerable online debate that media organisations were jumping to unverified conclusions without any available evidence. At the other end of the spectrum, audiences were reporting their own observations of vehicles that were assumed to be carrying repatriated citizens. The conflation of fact and narrated observations added more doubt than certainty over this social reality.

> "...Pls no more coconut news. Random picture and we are supposed to believe?"
>
> "u say coconut news but I saw people ALL (sic) wearing masks and gloves, the drivers where (sic) Masks, and the windows were closed on the busses (sic)"
>
> "Vanuatu tumas (sic) gossip. How is this news? Tomorrow I take a photo of something and post to news"

Discussion

The COVID-19 pandemic timeline varies for each country and context. This is also reflected in the science communication around the pandemic. In the South Pacific, the timeline analysis alongside key events clearly reflects the initial uncertainty and need for information. Scientific information on COVID-19 prevention guidelines peaked during the February-March period as demonstrated with the use of terms like quarantine, isolation, outbreak, vaccine and PPE. This subsided in the following April-May period as containment strategies including lockdowns and state of emergency protocols were introduced across a number of countries and the science and terminology became normalised and co-opted in common parlance.

Further qualitative investigation of discussions on Facebook (using the Connected Concept Analysis method) revealed glimpses of how science communication through Facebook in the Pacific has assumed a sense of contextual appropriation, fostering a localised autonomy in meaning-making. It would however be remiss to assume that the process of meaning-making starts and ends with social media. Communication and information flows in the Pacific tend to first originate from interpersonal forms of conversation outside the online sphere, through word-of-mouth. As such, the boundaries between factual and non-factual (experiential narratives) often intersect in various ways; an intersection that was empirically visible in our dataset.

While social media played an active role in the cultural and social appropriation of specific scientific concepts around COVID-19 (sometimes to the detriment of scientific fact) through various Pacific based communities, interpersonal communication played a key role in affirming these stories with sense of informal 'truth value' based on word-of-mouth. The reliance placed on individual narratives and hearsay also extended to how audiences rationalised the broader impact of COVID-19 on social reality. The predominance of word-of-mouth narratives and its impact in problematising the relationship between fact and experiential accounts was succinctly captured by a well-worn phrase in Pacific social media parlance — 'coconut wireless'.

'Coconut wireless' symbolises the cultural fluidity through which fact and experiential accounts posted on social media merge and overlap, consequently creating a highly contextual 'reality'. It also provides a timely reminder that the study of how society understands science communication is part of a broader sociological inquiry into how meaning and purpose are constructed in science among users/ audiences across social reality. An appreciation of the 'labour' involved in piecing together these various strands of perspectives is crucial to understanding how to communicate science in ways that capture the interplay between science communication and the context in which it operates.

The inclusion of local knowledge, concepts, principles, values and ideas into science communication can only be facilitated if media and specialised science communicators (including knowledge brokers) develop and maintain a sensitivity to the seemingly mundane conversations around key science concepts and policy, such as the social media data presented in this paper. Fischhoff [2019] argues that listening to the cultural and everyday narratives around science also requires a strategic re-thinking of the *theory of change* behind science communication. This involves reflecting on whether the intended recipients of the communication material in question have been sufficiently consulted in creating those messages [Fischhoff, 2019]. Further to this, it is posited that an effective theory of change model in science communication takes into account how recipients understand science communication messages through their respective value and cultural based frameworks of reference [Fischhoff, 2019]. In the above instance, mutual understanding between communicator (e.g. media practitioners and/or knowledge broker) and recipient is not assumed but critically reflected upon at various stages of the communication process.

Conclusion

This research study has provided an insight into how online audiences in the South Pacific appropriate and configure culturally rich understandings of specific scientific concepts around COVID-19 that inform their social reality. While much has been published on the mediatisation of science communication and the need for continued collaboration between practitioners of science and the media, there is also an equally pressing need to acknowledge that understanding science is also the work of making meaning by audiences and users of such information. The cultural and social rationalisation of scientific concepts (around COVID-19 and the pandemic more broadly) may in instances lead to misinformation or disinformation which are potentially dangerous outcomes. However, understanding the various cultural indicators used to assess and develop contextually specific understandings of the pandemic (e.g. on what social distancing means for a Pacific Islander) can allow science communication practitioners to inform and engage, with sensitivity and empathy that addresses the needs of their audiences.

Listed below are the main recommendations based on this study:

The "practice of doing science communication" is just as important as the science itself

The methodological practice of curating and classifying evidence in scientific disciplines is valuable in educating audiences on the need to base their assertions and observations around COVID-19 on carefully selected evidence. Whilst a focus

on the scientific accuracy of content is immeasurably important, the rigors of methodical inquiry through systematic fact-finding is equally crucial to constructively engage and inform discussions on social media like Facebook. Modules and short online courses on the importance of developing ideas based on fact and evidence could go a long way into providing audiences with a foundational grasp of effective communication around COVID-19.

Audience/User centred approach to science communication

There is a greater need to understand audiences and users of science information to ensure that science communication practitioners understand the context and landscape in which the information is received, interpreted, and shared. It is also critical to understand that science communication does not operate in a vacuum for audiences and during emergencies like the COVID-19 pandemic it intersects widely with social, economic, and geopolitical impacts on the users of such information.

Social media and online discourse can be a rich source of understanding audiences/users

As illustrated through the analysis, social media and online platforms offer publicly available information that can provide rich insights into how audiences and users engage with scientific terms. This allows scientists, communication practitioners and key government stakeholders to gain a greater grasp of how their communication strategies and information is operationalised at a granular level. Further to the above (and something beyond the scope of this study), a sentimental analysis framework could be applied on the collated social media data to measure audience sentiment towards specific aspects of science communication (e.g. Positive, Negative, Neutral). These quantitative data points will supplement and inform any further qualitative work, going forward.

Consistency in the use of scientific terminology

The use of commonly paired terms such as "quarantine, isolation" and "physical distancing, social distancing" can result in confusion amongst audiences. Furthermore, these terms become embedded into common parlance once introduced in official channels of communication and are accordingly adapted and appropriated, taking a life of their own. It is thus crucial that core scientific terms are carefully devised and structured as much as possible before public dissemination, whilst acknowledging core cultural sensitivities that may influence interpretation.

While this study adopted a regional (rather than nation specific) analysis of the Pacific, it is also important to acknowledge the cultural and linguistic diversity of the region, across nations within Micronesia, Polynesia and Melanesia. Each country presents, to variable extents, its own nuanced understanding of science communication and the impact of COVID-19.

Greater institutional focus on media literacy

There is value in developing and promoting audience-oriented discussions around media literacy at a regional and national level (if not extensively done already). These could comprise of sessions to members of the public that explain clearly how to critically evaluate media sources and differentiate between trusted avenues for news and science communication and typically problematic sources. In an age of rampant information flows and heightened online interactivity, media literacy education programs could further solidify public appreciation of the evidenced-based approach undertaken in science communication.

Appendix A. Architecture of data classification for science communication
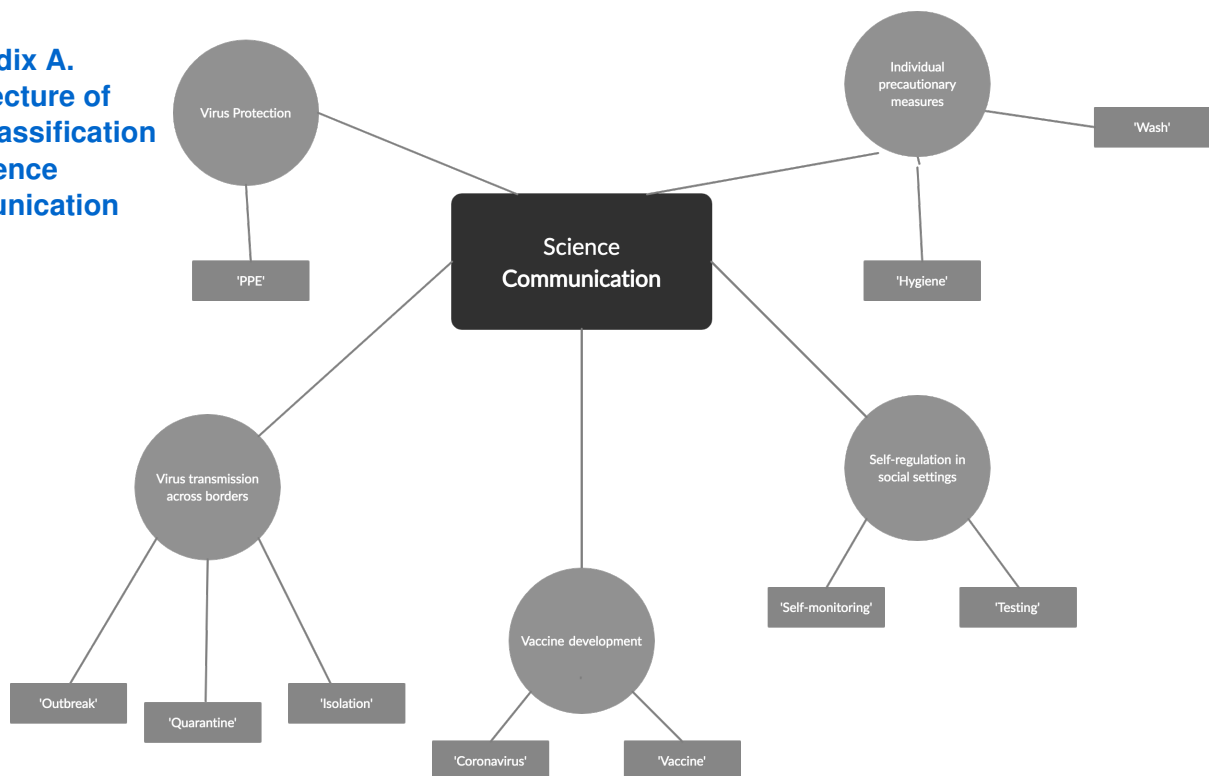
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