#WEAREMAUNAKEA: CONTENT ANALYSIS OF TWEETS REGARDING THE CONSTRUCTION OF THE THIRTY METER TELESCOPE ON MAUNA KEA

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By

Kapi‘olani Ching

Thesis Committe:

Jenifer Winter, Chairperson
Ann Auman
Francis Dalisay
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CHAPTER 1
INTRODUCTION

On March 30th, 2015, crews bearing heavy telescope machinery and construction equipment slowly made their way up the Mauna Kea Access Road, marking what was supposed to be the first day of construction for the Thirty Meter Telescope (TMT) on Mauna Kea’s Northern Plateau. Approved by the State of Hawai‘i in 2013 and funded by a number of private and public organizations, TMT on Mauna Kea would boast the ability to produce the clearest and sharpest views of outer space due to highly favorable atmospheric conditions and Mauna Kea’s virtually unobstructed view of the skies. While many in the science community believe that Mauna Kea is an appropriate choice as the site for TMT, there is a sizable group that believes otherwise. The day construction was scheduled to begin, TMT crews were met with a human blockade of demonstrators, activists, and concerned residents in strong opposition to the construction of the telescope atop Mauna Kea. In the weeks that followed, meetings, protests, and gatherings centered around the protection of Mauna Kea increased in frequency and size, capturing the attention of not only local news media but national and international media alike (Herman, 2015). But activism was in no way limited to activity on the mountain. Along with island-wide protests and gatherings, efforts to protect Mauna Kea also took to social media, generating significant statewide social media presence through the use of various hashtags (Hofschneider, 2015). Of the many hashtags brought forth by the movement against TMT, #WeAreMaunaKea became the most well-known and widely used hashtag amongst social media users with an interest in the movement. On Twitter, #WeAreMaunaKea generated thousands of tweets in a matter of days and experienced spikes during demonstrations and protests across the State and the continental U.S. The movement not only resonated within the Native Hawaiian community
but also with Hawai‘i’s general public and beyond. Celebrities began taking to social media to post #WeAreMaunaKea content, spreading general awareness to their fans. Prominent leaders in the Protect Mauna Kea group also utilized social media as a channel for information distribution while generating support and encouraging new followers. Citizens voiced their concerns, shared their opinions and became a part of a sizeable network of users. The product of a widespread investment in the welfare of Mauna Kea, #WeAreMaunaKea tweets represent a diverse set of perspectives and opinions in a space that both encourages verbal expression while also limiting its length. Whether sharing web content such as a news article on a recent anti-TMT demonstration, tweeting a photo of “We Are Mauna Kea” painted on the palms of their hands, or expressing an opinion about the potential harm TMT might cause, tweeters were united by #WeAreMaunaKea in the many weeks that followed. Delving further into #WeAreMaunaKea will first require a brief overview of the history behind TMT as well as Native Hawaiian cosmology and the cultural significance of the mountain.

1.1. TMT: The most capable and advanced telescope on Earth

Plans for the development of a next-generation telescope first began with the founding of the nonprofit TMT Observatory Corporation in 2003. Integrating the latest innovations and technologies, the proposed telescope would rival capabilities of telescopes across the globe, giving researchers the ability to observe some of the earliest galaxies in the universe, view planets and stars with revolutionary precision, and study objects in Earth’s solar system as they’ve never been seen before (Thirty Meter Telescope, 2007). In order for TMT to operate at its full potential, studies on atmospheric variables such as wind patterns, temperature, and visibility were performed at sites around the world to see where the telescope might perform best. The project team also performed environmental, financial, and cultural impact studies at
each prospective site to further evaluate its viability. Mauna Kea was finally selected as the preferred site for TMT in July 2009 after researchers determined that the mountain presented the most ideal conditions for the observatory.

Design and construction readiness plans were approved in June 2010 and over the course of the next three years, TMT underwent a series of public and private hearings (Gill, 2015). In April 2013, the Hawai‘i Board of Land and Natural Resources granted a permit for the TMT project. Managed by the University of Hawai‘i, the telescope would add to a collection of 13 existing telescopes on Mauna Kea, all a part of what is referred to as the Mauna Kea Science Reserve (UHERO, 2014). The Kahu Kū Mauna council, a Native Hawaiian, community-based council that advises the Mauna Kea Management Board on Hawaiian cultural matters regarding Mauna Kea, aided the board and the University of Hawai‘i in reviewing the TMT project. Under the approval of Kahu Kū Mauna, the University of Hawai‘i granted a sublease for TMT in May 2014 (Thirty Meter Telescope, n.d.). Initial plans for construction and completion projected that TMT would be operational by 2022 (Callis, 2014).

1.2. Protectors, not protestors

While TMT researchers identified Mauna Kea as an ideal location, many in the Native Hawaiian community opposed the construction of the telescope on Mauna Kea, considered by many to be one of the most sacred cultural sites in Hawai‘i (Worth, 2015; Apo, 2015). Early mention of Mauna Kea in Hawaiian tradition speaks of the mountain as the child of Papahānaumoku (commonly referred to as “Earth Mother” or the creator goddess of Hawai‘i) and Wākea (commonly referred to as “Sky Father”). Together, Papahānaumoku and Wākea not only gave birth to the Hawaiian islands but also, by way of their daughter Ho‘ohōkūkalani, to the people who would come to inhabit them. Through incestual relations with her father Wākea,
Hoʻohōkūkalani (literally translated as “creator of the stars”) gave birth to Hāloa, the first Hawaiian. Native Hawaiians are therefore the descendent of the larger celestial bodies of earth, sky and stars, all of which converge at Mauna Kea. As the Edith Kanakaʻole Foundation explains,

Mauna Kea is where heaven, earth and stars find union. Not just any heaven, but Wākea, not just any earth, but Papahānaumoku, and not just any constellation of twinkling lights, but Hoʻohōkūkalani, whose children descend and return to the stars. (Hoʻakea, LLC, 2009)

Mauna Kea is the anchor that connects the Native Hawaiian people to their spiritual and celestial ancestry, a piko (umbilical cord) that links them to their past, present and future. To many Native Hawaiians, the construction of yet another telescope on Mauna Kea not only desecrates the mountain but all that it represents. As many demonstrators have stressed, they are protectors, not protestors. The primary goal for many is repairing the sanctity of Mauna Kea. Not halting the overall advancement of astronomy, not preventing the evolution of modern science, but protecting this sacred site from further desecration.

The anti-TMT movement first began gaining momentum on October 7, 2014 when a group of demonstrators blockaded the Mauna Kea Access Road in an attempt to disrupt the TMT groundbreaking ceremony (Hodges, 2014). While the October demonstration certainly brought greater awareness of the project and the opposition surrounding TMT, the March 30th demonstration was by far the most pivotal in sparking significant social media activity. Although not much is known about who sent the first #WeAreMaunaKea tweet, the hashtag began trending in Hawaiʻi in the days and weeks that followed. Those in opposition of TMT expressed a number of concerns such as the legitimacy of the approval process, the environmental impact construction and maintenance of the telescope might have on natural resources, the disturbance of sacred sites on the mountain, tainting of the physical landscape, and overall poor management
of Mauna Kea in past years. The construction of yet another telescope brings to mind similar events throughout the course of Hawaiian history in which the presence of a foreign entity (in its various forms) did more harm than good. The arrival of missionaries to Hawaiʻi in the late 1700s began a whirlwind of introductions not only of foreign people but an epidemic of foreign diseases that devastated the Native Hawaiian population. The installation of English as the primary language in Hawaiʻi’s schools in the late 1800s nearly wiped out the ‘Ōlelo Hawaiʻi. More recently, the use of Kahoʻolawe as a U.S. bombing range during World War II left the island shell-shocked and irreversibly damaged. Although TMT poses no direct physical threat to the Hawaiian population, it poses a threat to the sanctity of one of the most culturally sacred places in Hawaiʻi and disregards the cultural heritage of the Hawaiian people.

#WeAreMaunaKea denotes this cultural heritage and connectedness to Mauna Kea while simultaneously providing a means for users across the globe to contribute to an ongoing narrative on TMT and other overarching themes. Therefore, the “we” in #WeAreMaunaKea bespeaks of the plurality of the movement and the collective cultural-consciousness and recognition of Mauna Kea as the ancestral origin of the Hawaiian people.

This study aims to provide an in-depth analysis and discussion of #WeAreMaunaKea by looking into the tactics tweeters used to spread the #WeAreMaunaKea message as well as the ways users rationalized their stance through 140-character tweets. How did tweeters contribute to the hashtag? In what ways did they justify their opinions? Given tweet brevity, what kinds of information did tweeters find most critical to include? While analyzing tweet content, we will also look at the actors behind tweets and which groups (e.g., citizens, journalists, celebrities, etc.) were most instrumental in contributing them. Lastly, we will study the use of ‘Ōlelo Hawaiʻi in
tweets under the context of one of the most significant uprisings in the Native Hawaiian community in the last decade.
CHAPTER 2
LITERATURE REVIEW

The subject of this research is the use of the #WeAreMaunaKea hashtag on Twitter. In order to gain a better understanding of the subject matter, previous research and literature is reviewed below. First is a brief overview of Twitter as a social networking service, as well as the role social media can play during social movements. Next, literature on different kinds of social media users is reviewed to provide context on the different kinds of actor types present in the #WeAreMaunaKea stream. Lastly, literature on language use is reviewed to provide context for the study of ‘Ōlelo Hawai‘i on social media.

2.1 Complexity of Twitter activity

Launched in 2006, Twitter is a social networking service in which registered users send 140-character tweets, brief blurbs on any topic (or no topic at all) of their choosing. Within the 140-character limit, users can include text, video or photo, hyperlinks, and hashtags. The hashtag, prefixed by the # symbol, is a word or phrase (spaces removed) which allows for users to contribute to and easily follow a particular thread of discussion or trending topic (Kwak, Lee, Park, & Moon, 2010). Author Michele Zappavigna (2012) describes the hashtag as an annotation of sorts, meant to mark the topic of a tweet and allow the tweet’s audience easy access to other tweets on the same topic by clicking on the hyperlinked hashtag. Message brevity and conciseness are of course essential in negotiating how to best use one’s 140-characters. But given the unavailability of more lengthy and intricate forms of expression, Twitter provides the right conditions for instantaneous information and content sharing. Where a post on other social media platforms can constitute several paragraphs of text, an album of several dozen photos, links to related web content and more, Twitter facilitates quick sharing and thus quick reading.
activities (Gleason, 2013). Maireder and Ausserhofer (2014) argue that the instantaneous nature of Twitter goes beyond what other social media services offer in that the instant sharing and absorption of content essentially creates an “awareness system that allows for immediate, fast, and widespread dissemination of information” (p. 306). This awareness system is more than just status updates and content sharing, this system can also serve as a way for user to participate in online civic engagement in real-time and with (mostly) real citizens.

According to Gleason (2013), Twitter can also serve as an educational tool for learning about social movements from society’s individual voices and perspectives. Rather than relying on news media for information, Twitter users can simply type in a hashtag such as #hiwx to get live updates on Hawai‘i weather or #hitraffic for traffic-related information. Where local news media only publishes stories representing an unbiased/neutral and generally limited range of viewpoints, Twitter encourages a more crowdsourced approach to staying informed on what is going on. Papacharissi and de Fatima Oliveira (2012) studied news storytelling on Twitter by analyzing tweets using #egypt during the Egyptian protests in early 2011. Tweets using the #egypt hashtag included both hard-hitting news about events as well as organic conversations about those events, essentially blending facts with opinions. In this way, the hashtag acts not only as a means of annotating tweets but also as a tool that deepens participants’ connection to a movement by allowing users to contribute to an ongoing, user-generated stream of information.

In the context of this study, #WeAreMaunaKea offers a device for users to express an opinion on TMT and Mauna Kea by identifying as part of the “We” who sympathize with the mountain.

In looking at any user-generated stream, the intermixing of neutral and subjective content is particularly complex. Naaman, Boase and Lai (2010) went so far as to create nine coding items to differentiate between information sharing tweets, tweets aimed at self promotion,
opinions/complains, statements and random thoughts, “me now” tweets (messages relating to themselves), questions to followers, presence maintenance, anecdotes involving themselves and anecdotes involving others. The depth of this type of analysis illustrates the fact that content takes many forms and serves many different purposes. Information sharing constitutes content that is informational in nature, such as links to outside sources. Other types of content such as opinions and complaints can constitute content that is more subjective including angry rants, heartfelt reflections, intrigued questions and more. Being able to identify between the two plays an important role in trying to understand the affordances of not only the social media platform but also the use of the hashtag.

Because #WeAreMaunaKea social media activity coincided with some smaller anti-TMT events such as protests, rallies and hearings, there is a possibility that #WeAreMaunaKea content included tweets coming from people “on the ground” or people who were physically present at said events. In this context, tweets can be used to help disseminate information, organize participants, rally protestors and/or encourage participation from the wider public. Previous studies have looked into the use of social networking sites to help people send messages from protest events. Veenstra (2013) explored the perceived differences between tweets that appear to be coming from users who are present at a protest and tweets that appear to be coming from users behind a computer. They found that users on the ground tend to post less URLs and more information in the tweet text itself, where as users at home have the advantage of easily navigating between internet browser windows to copy and paste URLs into Twitter. Other social networking sites such as Instagram and Vine facilitate the sharing of different types of media such as photos and video, while others such as Periscope allow users to record and stream events live from their mobile device. Distinguishing between the different tactics employed by users
using the #WeAreMaunaKea hashtag might reveal how the hashtag was used as well as what kinds of narratives arose from it.

2.2 Leaders in a virtual movement

Because there are no restrictions as to who is allowed to contribute to a particular hashtag stream, many scholars question whether movements on Twitter are leaderless, as there is no specified user or group of users acting as moderators. Certainly there are influential users who for various reasons give rise to bursts of activity in a stream. Celebrities are extremely influential in spreading awareness to audiences who are not within geographic or cultural proximity. Buente and Rathnayake (2015) looked into celebrity influence in the #WeAreMaunaKea movement on Twitter and found that centrality in the network was influenced by both prestige and level of engagement of celebrity Twitter users. Celebrities brought influence to the #WeAreMaunaKea network not only by sending out tweets but by engaging with other users through retweeting, and mentions. In terms of news coverage, journalists play an influential role in generating stream content by contributing unbiased or neutral information. For example, Lotan et al. (2011) analyzed tweets using the hashtag #sidibouzid during the Tunisian Revolution in late 2010. As part of their study, tweets including #sidibouzid or the keyword “Tunisia” posted within a specified time range were extracted and categorized by actor type such as mainstream media, journalists, bloggers, activists, celebrities, etc. They found that these Twitter streams were largely spearheaded by journalists who not only covered news events but also highlighted public sentiment surrounding these events. In this way, journalists were contributing material to their parent news organization while maintaining relevancy in the Twitter stream. For the most part, journalists would often post informational-type content while also retweeting relevant content posted by other users. Running alongside journalists in these streams were vocal opinion leaders
such as bloggers and activists who were more likely to express emotive opinions and comments in the context of recent events. Activists and citizens would often take the information posted by journalists and share it on their own accounts, sometimes adding their own commentary and/or opinions regarding the subject matter. This mixture of news sharing and opinion sharing contribute to what the authors refer to as an ambient information-sharing environment in which updates are not only live and newsworthy but lively and full of expression.

In their study, Naaman, Boase and Lai (2010) looked at what they referred to as active “personal” users or users who appear to be using a personal Twitter account as compared to organizations or marketers using Twitter to sell a product. The authors then categorized users as “informers” or people who tweet informational-type messages, and “meformers”, or people who tweet messages relating to themselves or their own personal thoughts. The authors found that “informers” tended to be more conversational and interacted more with other users, whereas “meformers” were not as engaged with other users. Concluding their study, the authors found that 20 percent of users within their sample were “informers” while 80 percent were “meformers.” Also along the lines of studying actor types, Sloan et al. (2015) developed an algorithm to help them categorize Twitter users by age and occupation. Although their study did not look at content of tweets, the authors comment that being able to differentiate users by age and occupation opens up numerous avenues for content analysis-type research such as use of specific syntax, emoticons, colloquialisms and more.

In the case of #WeAreMaunaKea, the ambient information-sharing environment created by the presence of numerous different actor types is made especially unique by the use of ‘Ōlelo Hawai‘i (‘Ōlelo Hawai‘i) as a mode of expression.
2.3 ‘Olelo Hawai‘i and political expression

The use of ‘Olelo Hawai‘i on social media reflects a resurgence of what many had believed to be a virtually extinct language. The banning of ‘Olelo Hawai‘i in Hawai‘i’s schools and government in the late 1800s led to a significant decrease in native speakers throughout the first half of the 20th century. However, through the efforts of many dedicated educators and Native Hawaiian community members, the language is making a promising recovery (Kawai‘ea, Housman and Alencastre, 2007). According to a 2000 census report, there were close to 27,000 ‘Olelo Hawai‘i speakers around the world, 19,000 of whom reside in Hawai‘i (Ng-Osorio and Ledward, 2011). To see the language used on Twitter reflects a certain degree of integration into society as well as the language’s role in helping Twitter users construct and maintain their identity as ‘Olelo Hawai‘i speakers and learners. As ‘Olelo Hawai‘i instructor and scholar Laiana Wong writes, “[s]uccessful language revitalization efforts depend critically on achieving a stable system for transmitting the language across generations” (p. 95). Not only is increased use of the language necessary, but there must be domains and communication channels that encourage and facilitate this increased usage. Older generations used channels such as the many ‘Olelo Hawai‘i newspapers that ran throughout the mid-nineteenth to early twentieth centuries. As for today’s young generations, Twitter may be the newest communication channel playing an increasingly important role in ongoing language revitalization.

As many traditional communication scholars have found, language is a powerful dynamic in studying linguistic relativism and how people who speak different languages perceive the world around them. In the social media landscape, Hong, Convertino and Chi (2011) found that users of different languages used Twitter differently, suggesting that language may have something to do with perceived affordances for using social media. German-language users
tended to include URLs and hashtags in tweets, while Korean-language users tended to interact more with others by replying directly to other users. As for the use of ‘Ōlelo Hawai‘i, the near future may see more ‘Ōlelo Hawai‘i tweeters making way for further research on language diversity on the Internet.

For bilingual Twitter users, deciding when and where to use which language can have as much to do with politics as the message in itself. Litt (2012) describes the “imagined audience”, or the audience a user envisions when mediated communication is open to the public and not limited to a known audience. According to Litt, a number of factors such as social norms and motivations for social media usage influence the formation of a user’s imagined audience. Conceptualization of an imagined audience may have much to do with how social media users interact with potentially diverse audiences, particularly when choosing which language to use.

Kim et al. (2014) studied the phenomenon of bilingualism on Twitter and how a user’s choice of language affected interactions with their audiences. One question the authors pose is whether bilingual tweeters’ choice of language is based on how best to maximize their audience. If a majority of the user’s followers can only understand English, is the user likely to tweet primarily in English? Do bilingual users switch between languages depending on the topic of the tweet? Through their research, the authors found that bilingual users are more likely to post informational and political tweets in local language while using English for more leisure-related tweets. Users tweeting in local language were found to be more influential in their regional networks, a finding that presents interesting implications in the study of semantics and political expression. A majority of #WeAreMaunaKea tweets are written primarily in English, but a number of tweets include powerful Hawaiian keywords and phrases such as kānaka maoli (Native Hawaiians) and mālama ‘āina (to take care of the land). Studying the extent to which
ʻŌlelo Hawai‘i is used to express certain trains of thought will help uncover affordances associated with using local language for political expression.

Research Questions

This study aims to analyze #WeAreMaunaKea by looking into the content of tweets as well as the actors who generated said tweets. The following research questions will guide this work:

- **RQ1**: To what extent are #WeAreMaunaKea tweets used for information sharing versus opinion sharing?
- **RQ2**: What rationales are most prevalent in #WeAreMaunaKea tweets against the construction of TMT on Mauna Kea?
- **RQ3**: What types of actors using the #WeAreMaunaKea hashtag were most prevalent?
- **RQ4**: To what extent do #WeAreMaunaKea tweets using ʻŌlelo Hawai‘i?
CHAPTER 3

METHODS

Content analysis

In order to address the research questions above, content analysis was used. Because tweets are made up primarily of text, tweet content can be coded and analyzed in the context of the research questions. Below is a description of the study’s sample, data collection, coding categories, and data analysis.

Sample

The sample population consists of all publicly available tweets containing the #WeAreMaunaKea hashtag sent between April 29 and May 12, 2015. Altogether, this sample includes 2,690 tweets. Tweets that were either retweets or direct mentions were coded and set aside from the total sample. After setting aside all retweets and direct mentions, the total sample used for this analysis was 826 tweets.

This sample population was chosen to coincide with a relatively nondescript time period during the anti-TMT movement in which no major events (e.g. arrests, major rallies/protests, etc.) took place. By using this time period, tweets were not largely a reflection of one particular trending topic or event.

Collection

All publicly available tweets containing “#WeAreMaunaKea” posted anytime between the two week period were extracted and downloaded onto an Excel spreadsheet. Extracted data includes the Twitter user’s handle, the date and time the tweet was posted, the text contained in the tweet, other Twitter users mentioned in the tweet, and additional hashtags contained in the tweet.
Coding categories

Following Gleason’s (2013) format for developing codes, coding units were used to classify tweets into various categories. Level 1 coding first coded tweets by stance, tactics, and rationale. In order to analyze stance, tweets were coded by: 1) Pro-TMT; 2) Anti-TMT; or 3) Neutral. Preliminary analysis showed that the large majority of tweets express an anti-TMT stance. Therefore, any Pro-TMT or neutral tweets were recorded primarily for statistical purposes. In order to analyze the tactics used in tweets, as addressed in RQ1, coders categorized each tweet into either: 1) Information sharing; or 2) Opinion sharing. Tweets under the information sharing category included tweets posed for the purpose of information dissemination such as tweets sharing information on gatherings, rallies, protests and petitions. Tweets under the opinion sharing category included tweets posed for the purpose of sharing an opinion not otherwise attributed to an outside source. An example of each tactic category is shown in the table below.

<table>
<thead>
<tr>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sharing</td>
</tr>
<tr>
<td>“Excerpt from #Honolulu Star-Advertiser Editorial supporting TMT <a href="http://t.co/b3EXE8jTjh%E2%80%9D">http://t.co/b3EXE8jTjh”</a></td>
</tr>
<tr>
<td>Opinion sharing</td>
</tr>
<tr>
<td>“So sad to see @UHawaiiNews shilling for ecocide and native land grabs”</td>
</tr>
</tbody>
</table>

Table 1: Examples of information and opinion sharing tweets

In order to analyze the prevalence of different rationales expressed in tweets, as addressed in RQ2, level 1 coding also classified tweets into one of five categories: 1) Celebrity involvement; 2) Foreign occupation; 3) Commodification; 4) Kuleana; or 5) Cultural significance/sacredness. “Celebrity involvement” includes tweets commending celebrity involvement in the movement against TMT. “Foreign occupation” includes tweets alluding to the
construction of TMT as foreign invasion on native/sacred land. “Commodification” includes tweets that remark on the inappropriate use of Mauna Kea for money-making purposes. “Kuleana”, or the inherent sense of responsibility an individual has for the land and its wellbeing, includes tweets in which the tweeter takes on responsibility for the protection and preservation of Mauna Kea. “Cultural significance/sacredness” includes tweets that comment on the cultural significance and/or sacredness of Mauna Kea according to Native Hawaiian culture and/or ideology. An example of each rationale is shown in the table below.

<table>
<thead>
<tr>
<th>Rationale</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celebrity involvement</td>
<td>“Wow, one of the greats in baseball right now showing his support for the Big Island”</td>
</tr>
<tr>
<td>Foreign occupation</td>
<td>“settlers and US govt have done this to native ppl throughout history; doesn’t suddenly become okay bc its 21st century”</td>
</tr>
<tr>
<td>Commodification</td>
<td>“‘Not everything in Hawai‘i is for sale’”</td>
</tr>
<tr>
<td>Kuleana</td>
<td>“‘Our humanity is OUR kuleana!’”</td>
</tr>
<tr>
<td>Cultural significance/sacredness</td>
<td>“To level the sacred summit of Mauna Kea is literal erasure of Hawaiian culture.”</td>
</tr>
</tbody>
</table>

Table 2: Examples of rationales

In order to analyze the types of actors using the #WeAreMaunaKea hashtag, level 2 coding categorized tweets into one of nine actor types: 1) Hawai‘i mainstream media organizations; 2) Journalists/bloggers; 3) Non-media organizations; 4) Activism organizations; 5) Citizens; 6) Celebrities; 7) Researchers; 8) Bots; or 9) Other. “Hawai‘i mainstream media organizations” constitutes tweets sent by local Hawai‘i news and media organizations.
“Journalists/bloggers” constitute tweets sent by journalists or bloggers working for media organizations or independently. “Non-media organizations” constitute tweets sent by groups, companies, or organizations that are not primarily news-oriented. “Activism organizations” constitute tweets sent by activism-oriented groups including environmental, social, and political activism. “Citizens” constitute tweets sent by general citizens who appear to be using a personal account. “Celebrities” constitute tweets sent by individuals who are famous for reasons unrelated to technology, politics, or activism. “Researchers” constitute tweets sent by individuals who are affiliated with a university of think-tank. “Bots” constitute tweets sent by accounts that appear to be an automated tweeting service. And lastly, “Other” constitutes tweets that are sent by accounts that do not clearly fit into any of the categories described above. An example of each actor type is shown in the table below

<table>
<thead>
<tr>
<th>Actor type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media organizations</td>
<td>@CivilBeat</td>
</tr>
<tr>
<td>Journalists/bloggers</td>
<td>@ahofschneider</td>
</tr>
<tr>
<td>Non-media organizations</td>
<td>@Na_Mea_Hawaii</td>
</tr>
<tr>
<td>Activism organizations</td>
<td>@ProtectMaunaKea</td>
</tr>
<tr>
<td>Citizens</td>
<td>@michele96744</td>
</tr>
<tr>
<td>Celebrities</td>
<td>@PrideofGypsies</td>
</tr>
<tr>
<td>Researchers</td>
<td>@DrGlenBarry</td>
</tr>
<tr>
<td>Bots</td>
<td>@AlohaVid</td>
</tr>
<tr>
<td>Other</td>
<td>@Invest_Donate</td>
</tr>
</tbody>
</table>

Table 3: Examples of actor types

Lastly, in order to analyze the use of ‘Ōlelo Hawai‘i on Twitter, as addressed by RQ4, level 3 coding will categorize tweets into one of the following categories: 1) No use of ‘Ōlelo
Hawai‘i; 2) Use of some Hawaiian keywords; 3) Use of Hawaiian phrases; or 4) Written completely in Hawaiian. Tweets that do not include any Hawaiian words will fall into the “No use of ‘Ōlelo Hawai‘i” category. Tweets that are written primarily in English but include one or more Hawaiian keywords will fall into the “Use of some Hawaiian keywords” category. Tweets that include Hawaiian phrases made up of two or more Hawaiian words will fall into the “Use of Hawaiian phrases” category. Lastly, tweets that are written entirely in Hawaiian will fall into the “Written completely in Hawaiian” category. An example of each category is shown below.

<table>
<thead>
<tr>
<th>Use of ‘Ōlelo Hawai‘i</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>No use of ‘Ōlelo Hawai‘i</td>
<td>“Mauna Kea’s Thirty Meter Telescope Project Further Protests: NY City News”</td>
</tr>
<tr>
<td>Use of some Hawaiian keywords</td>
<td>“Hawaiians support #WeAreMaunaKea so that the keiki (kids) can still have some sort of pride left over for their land.”</td>
</tr>
<tr>
<td>Use of some Hawaiian phrases</td>
<td>“Hau‘oli lā Makuahine from Mauna a Wakea”</td>
</tr>
<tr>
<td>Written completely in ‘Ōlelo Hawai‘i</td>
<td>“Mahalo nui loa iā @kahookahikanuha no nā pāpale hou.”</td>
</tr>
</tbody>
</table>

Table 4: Examples of ‘Ōlelo Hawai‘i use

A codebook (Appendix A) was created to guide the systematic coding of tweets. Each tweet on the Excel spreadsheet (see coding sheet in Appendix B) will be assigned a tweet number that will correspond to a column on the code sheet provided to the coders. Tweet content will then be coded by the primary researcher along with a second coder, who will code a subset of the total tweets. Results will be tested for intercoder reliability using Scott’s $\pi$ formula.

**Data analysis**

Results from the first half of level 1 coding (stance and tactics) will shed light on RQ1 and the extent to which tweets are being used for information sharing versus opinion sharing. The second half of level 1 coding (rationales) will shed light on RQ2 and the prevalence of
various rationales in tweets. Level 2 coding (actor type) will shed light on RQ3 and which actors are most prevalent in the #WeAreMaunaKea hashtag stream. Lastly, level 3 coding (ʻŌlelo Hawai‘i) will shed light on RQ4 and the extent to which ʻŌlelo Hawai‘i is used in #WeAreMaunaKea tweets. Descriptive frequencies are provided for each in order to address each research question. In addition to the above frequencies, Chi-square tests were performed to test the association between 1) actor type and rationale and 2) actor type and use of ʻŌlelo Hawai‘i.
CHAPTER 4
RESULTS

In this chapter, the results of the study are presented as they pertain to each research question. A sample of 1,672 tweets were coded, which constituted #WeAreMaunaKea tweets over a two-week period between April 29, 2015 and May 12, 2015. First, tweets that were either retweets or direct mentions were coded and set aside from the total sample. Retweets are simply a re-sharing of an original tweet, while direct mentions are tweets that are specifically directed at a particular user and not necessarily meant for the general public. After setting aside all retweets and direct mentions, the total sample used for this analysis was 826 tweets.

Research question 1

Research question 1 asked to what extent are #WeAreMaunaKea tweets used for information sharing versus opinion sharing. According to coding protocol, all 826 tweets were coded as either information sharing or opinion sharing. To answer research question 1, the frequency of the two categories is shown in Table 1.

<table>
<thead>
<tr>
<th>%</th>
<th>1) Information sharing</th>
<th>2) Opinion sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>81.35%</td>
<td>18.64%</td>
</tr>
<tr>
<td></td>
<td>672</td>
<td>154</td>
</tr>
</tbody>
</table>

Table 5: Frequency of #WeAreMaunaKea tactics (n=826)

81.35% of tweets constituted information sharing type tweets, while 18.64% of tweets constituted opinion sharing type tweets.

Research question 2

Research question 2 asked which rationales are most prevalent in #WeAreMaunaKea tweets against the construction of TMT on Mauna Kea: celebrity involvement, foreign occupation, commodification, kuleana, cultural significance/sacredness, or other. To address this
research question, tweets that were coded as opinion sharing were coded into one of the six categories, the frequencies of which are shown in Table 2.

<table>
<thead>
<tr>
<th>Celebrity involvement</th>
<th>Foreign occupation</th>
<th>Commodification</th>
<th>Kuleana</th>
<th>Cultural significance/sacredness</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>2.59%</td>
<td>28.57%</td>
<td>2.59%</td>
<td>16.88%</td>
<td>45.45%</td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>44</td>
<td>4</td>
<td>26</td>
<td>70</td>
</tr>
</tbody>
</table>

Table 6. Frequency of #WeAreMaunaKea rationales (n=154)

The results were as follows: celebrity involvement constituted 2.59% of opinion sharing tweets, foreign occupation constituted 28.57% of opinion sharing tweets, commodification constituted 2.59% of opinion sharing tweets, kuleana constituted 16.88% of opinion sharing tweets, cultural significance/sacredness constituted 45.45% of opinion sharing tweets and 3.89% of opinion sharing tweets were categorized as other.

Research question 3

Research question 3 asked what types of actors using the #WeAreMaunaKea hashtag were most prevalent. To address this question, both information sharing and opinion sharing tweets were categorized by one of the following seven actor types: media organization, non-media organization, activism organization, citizen, celebrity, researcher, or bot. The frequencies of each actor type are shown in Table 3 below.

<table>
<thead>
<tr>
<th>Media organization</th>
<th>Non-media organization</th>
<th>Activism organization</th>
<th>Citizen</th>
<th>Celebrity</th>
<th>Researcher</th>
<th>Bot</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>1.45%</td>
<td>10.41%</td>
<td>19.73%</td>
<td>38.86%</td>
<td>0.48%</td>
<td>5.56%</td>
</tr>
<tr>
<td>N</td>
<td>12</td>
<td>86</td>
<td>163</td>
<td>321</td>
<td>4</td>
<td>46</td>
</tr>
</tbody>
</table>

Table 7: Frequency of #WeAreMaunaKea actor types (n=826)

The results were as follows: media organizations constituted 1.45% of tweets, non-media organizations constituted 10.41% of tweets, activism organizations constituted 18.73% of tweets, citizens constituted 38.86% of tweets, celebrities constituted 0.48% of tweets, researchers constituted 5.56% of tweets and bots constituted 23.48% of tweets.
Research question 4

Research question 4 asked to what extent do #WeAreMaunaKea tweets use ‘Ōlelo Hawai‘i. To address this research question, information sharing and opinion sharing tweets were categorized into one of the following four categories: no use of ‘Ōlelo Hawai‘i, use of some Hawaiian keywords, use of some Hawaiian phrases, or written completely in ‘Ōlelo Hawai‘i.

The frequencies of each are shown in Table 4 below.

<table>
<thead>
<tr>
<th></th>
<th>No use of ‘Ōlelo Hawai‘i</th>
<th>Use of some Hawaiian keywords</th>
<th>Use of some Hawaiian phrases</th>
<th>Written completely in ‘Ōlelo Hawai‘i</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>77.8%</td>
<td>8.95%</td>
<td>12.71%</td>
<td>0.48%</td>
</tr>
<tr>
<td>N</td>
<td>643</td>
<td>74</td>
<td>105</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 8: Frequency of use of Hawaiian language (n=826)

Results were as follows: 77.8% of tweets were categorized as using no ‘Ōlelo Hawai‘i, 8.95% of tweets were categorized as having used some Hawaiian keywords, 12.71% of tweets were categorized as having used some Hawaiian phrases and 0.48% of tweets were categorized as having been written completely in the ‘Ōlelo Hawai‘i.

Inter-coder reliability

In order to ensure the reliability of the coding protocol, a second coder was asked to code a subset of the sample. Of the total sample size of 1672 tweets, the second coder coded 20% of the sample, a total of 335 tweets. The sample for the second coder was selected by extracting every 5th tweet from the sample, to account for fluctuating tweet activity over the two-week period. The percentage of agreement between the primary researcher and second coder for all coding categories were as follows: 79.4% for tactic, 74.3% for rationale, 93.4% for actor type and 91.6% for use of ‘Ōlelo Hawai‘i.
Chi-square tests

In addition to the above frequencies, Chi-square tests were performed to test the association between 1) actor type and rationale and 2) actor type and use of Ōlelo Hawai‘i. In order to facilitate this test, information sharing was combined under rationale along with celebrity involvement, foreign occupation, commodification, kuleana, cultural significance/sacredness and other. An association between actor type and rationale was found, $\chi^2(36, N = 826) = 313.300, p \leq 0.001$. The frequencies for each are shown in Table 5 below.

<table>
<thead>
<tr>
<th></th>
<th>Media org</th>
<th>Non-media org</th>
<th>Activism org</th>
<th>Citizen</th>
<th>Celebrity</th>
<th>Researcher</th>
<th>Bot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sharing</td>
<td>1.78%</td>
<td>8.92%</td>
<td>12.5%</td>
<td>43.6%</td>
<td>0.44%</td>
<td>3.86%</td>
<td>28.8%</td>
</tr>
<tr>
<td>(N=672)</td>
<td>(N=12)</td>
<td>(N=60)</td>
<td>(N=84)</td>
<td>(N=293)</td>
<td>(N=3)</td>
<td>(N=26)</td>
<td>(N=194)</td>
</tr>
<tr>
<td>Celebrity</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>involvement</td>
<td>(N=0)</td>
<td>(N=0)</td>
<td>(N=0)</td>
<td>(N=4)</td>
<td>(N=0)</td>
<td>(N=0)</td>
<td>(N=0)</td>
</tr>
<tr>
<td>Foreign</td>
<td>0%</td>
<td>23.25%</td>
<td>51.16%</td>
<td>9.3%</td>
<td>0%</td>
<td>16.27%</td>
<td>0%</td>
</tr>
<tr>
<td>occupation</td>
<td>(N=0)</td>
<td>(N=10)</td>
<td>(N=22)</td>
<td>(N=4)</td>
<td>(N=0)</td>
<td>(N=7)</td>
<td>(N=0)</td>
</tr>
<tr>
<td>Commodification</td>
<td>0%</td>
<td>75%</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>(N=4)</td>
<td>(N=3)</td>
<td>(N=0)</td>
<td>(N=0)</td>
<td>(N=1)</td>
<td>(N=0)</td>
<td>(N=0)</td>
<td>(N=0)</td>
</tr>
<tr>
<td>Kuleana</td>
<td>0%</td>
<td>34.61%</td>
<td>34.61%</td>
<td>26.92%</td>
<td>0%</td>
<td>3.84%</td>
<td>0%</td>
</tr>
<tr>
<td>(N=26)</td>
<td>(N=9)</td>
<td>(N=9)</td>
<td>(N=7)</td>
<td>(N=0)</td>
<td>(N=1)</td>
<td>(N=0)</td>
<td>(N=0)</td>
</tr>
<tr>
<td>Cultural significance</td>
<td>0%</td>
<td>4.22%</td>
<td>67.6%</td>
<td>11.26%</td>
<td>0%</td>
<td>16.9%</td>
<td>0%</td>
</tr>
<tr>
<td>/sacredness</td>
<td>(N=0)</td>
<td>(N=3)</td>
<td>(N=48)</td>
<td>(N=8)</td>
<td>(N=0)</td>
<td>(N=12)</td>
<td>(N=0)</td>
</tr>
<tr>
<td>(N=71)</td>
<td>(N=1)</td>
<td>(N=0)</td>
<td>(N=1)</td>
<td>(N=1)</td>
<td>(N=0)</td>
<td>(N=0)</td>
<td>(N=0)</td>
</tr>
<tr>
<td>Other</td>
<td>0%</td>
<td>16.6%</td>
<td>0%</td>
<td>66.6%</td>
<td>16.6%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>(N=6)</td>
<td>(N=1)</td>
<td>(N=0)</td>
<td>(N=0)</td>
<td>(N=4)</td>
<td>(N=1)</td>
<td>(N=0)</td>
<td>(N=0)</td>
</tr>
</tbody>
</table>

Table 9: Chi-square test for association between rationale and actor type

Results show that there was a significant association between information sharing and citizens, celebrity involvement and citizens and “other” type tweets and citizens. There was also an association between foreign occupation and activism organizations as well as cultural significance/sacredness and activism organizations. Commodification was associated with non-
media organizations and kuleana was associated with non-media organizations and activism organizations.

Along with actor type and rationale, a Chi-square test was also performed to test the association between actor type and use of ‘Ōlelo Hawai‘i. An association was found, $\chi^2 (18, N = 826) = 142.760, p \leq 0.001$. The frequencies of each are shown in Table 6 below.

<table>
<thead>
<tr>
<th>Use of Hawaiian language</th>
<th>Media org (N=643)</th>
<th>Non-media org (N=74)</th>
<th>Activism org (N=105)</th>
<th>Citizen (N=4)</th>
<th>Celebrity (N=4)</th>
<th>Researcher (N=4)</th>
<th>Bot (N=4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No use of ‘Ōlelo Hawai‘i</td>
<td>1.08% (N=7)</td>
<td>6.84% (N=44)</td>
<td>22.08% (N=142)</td>
<td>34.37% (N=221)</td>
<td>0.31% (N=2)</td>
<td>5.28% (N=34)</td>
<td>30.01% (N=193)</td>
</tr>
<tr>
<td>Use of some Hawaiian keywords</td>
<td>0% (N=0)</td>
<td>14.8% (N=11)</td>
<td>12.16% (N=9)</td>
<td>60.81% (N=45)</td>
<td>1.35% (N=1)</td>
<td>10.81% (N=8)</td>
<td>0% (N=0)</td>
</tr>
<tr>
<td>Use of some Hawaiian phrases</td>
<td>4.76% (N=5)</td>
<td>29.52% (N=31)</td>
<td>11.42% (N=12)</td>
<td>48.57% (N=51)</td>
<td>0.95% (N=1)</td>
<td>3.8% (N=4)</td>
<td>0.95% (N=1)</td>
</tr>
<tr>
<td>Written completely in Hawaiian</td>
<td>0% (N=0)</td>
<td>0% (N=0)</td>
<td>0% (N=0)</td>
<td>100% (N=4)</td>
<td>0% (N=0)</td>
<td>0% (N=0)</td>
<td>0% (N=0)</td>
</tr>
</tbody>
</table>

*Table 10: Chi-square test for association between use of Hawaiian language and actor type*

Most notably, more than half of tweets categorized as having used some Hawaiian keywords were associated with citizens, and all four tweets written completely in Hawaiian came from citizens.
CHAPTER 5
DISCUSSION

In this chapter, findings are discussed in four sections in order to analyze #WeAreMaunaKea tweets sent between April 29, 2015 and May 12, 2015. First, the extent to which #WeAreMaunaKea tweets were used for information sharing versus opinion sharing is addressed. Second, what rationales were most prevalent in #WeAreMaunaKea tweets against the construction of TMT on Mauna Kea are discussed. Third, the prevalence of different actor types is discussed. And finally, the extent to which #WeAreMaunaKea tweets used ʻŌlelo Hawaiʻi is addressed.

Information versus opinion sharing

The results of this study showed that within the two-week timeframe, 81% of #WeAreMaunaKea tweets were used for information sharing purposes. Coders found that this included tweets meant to help disseminate information about events as well as live-tweets sent during these events. For example, Figure 1 includes an information sharing tweet in which the user appears to be quoting Williamson Chang. Chang, a Professor of Law at the University of Hawaiʻi, spoke at an Office of Hawaiian Affairs Board of Trustees Meeting on April 30. The meeting was live streamed through ʻŌiwi TV, and the photo included in the tweet appears to be a screenshot of the video rather than a higher resolution photo taken from inside the conference room. Keala Kelly does not appear to be expressing an original and/or personal opinion, but rather justifies an anti-TMT stance by quoting an authority in the anti-TMT debate.
Figure 1: Example of an information sharing tweet

Figure 2 includes an information sharing tweet in which the user is commenting on a live broadcast in which UH Mānoa Hawaiian studies professor Jon Osorio and Astrophysicist Paul Coleman appeared on PBS Insights. Again, rather than expressing an original and/or personal opinion on TMT, Will Caron offers commentary on the remarks made during a live broadcasted debate.

Figure 2: Second example of an information sharing tweet

Additionally, information sharing tweets also included sharing of news articles, blog posts and images. This finding is particularly interesting given the use of #WeAreMaunaKea as a predominantly anti-TMT hashtag. Did anti-TMT users feel that information sharing was a more effective tactic in expressing an anti-TMT stance? Or were information sharing tweets more
intended to endorse an anti-TMT stance rather than rationalize it? Or did users simply feel uncomfortable sharing a personal opinion? Ho and McLeod (2008) paint an interesting analogy in discussing face-to-face interactions as compared to computer-mediated communication. They explain that during face-to-face interactions, nonverbal cues such as intonation, facial expressions and gestures can help reinforce a message. Say for instance, a person utters the expression, “I am against TMT,” and reinforces this stance with an assertive tone and resolute facial expression. This would help strengthen his or her message. During computer-mediated communication, Ho and McLeod argue that the absence of nonverbal cues could lessen the intensity of a message. However, during computer-mediated communication, such as the use of social media services, the act of posting information-sharing type content can help to reinforce a previously stated opinion in the same way nonverbal cues help to intensify a message. For example, a user could share an anti-TMT sentiment on Twitter, and follow up by posting an anti-TMT blog article, sharing information about anti-TMT events, etc. In the context of this study’s findings, the presence of more information-sharing type posts could be acting as reinforcement to the overall anti-TMT stance as well as the individual anti-TMT opinions shared by users. Some users may believe that sharing information from news sources may make their previously stated opinions appear more credible. This underscores the importance of differentiating between information sharing and opinion sharing when analyzing posts on social media, as each plays a distinct role in shaping hashtag streams.

Papacharissi et al. (2012) discuss the instantaneity of Twitter and how the service plays a unique role during current events. As discussed above, information-sharing tweets often included posts that shared information about live events such as rallies, protests, hearings and assemblies, sometimes from users who appeared to be “on the ground” or physically present at said events.
Twitter afforded users on the ground the ability to immediately disseminate information about event happenings, oftentimes before news media and journalists got the chance. Results from the Chi-square test shows an association between information sharing tweets and citizens, posing the question as to whether users were physically present at events when posting #WeAreMaunaKea content. Although this current study did not aim to differentiate between the two types, the large majority of information sharing tweets appeared to be aimed at keeping everyone informed about what was happening at events rather than attempting to coordinate or organize protestors.

Something important to note is that a good majority of TMT-related events were live-streamed online through ‘Ōiwi TV, with numerous other media outlets covering events as well. As Figure 1 illustrated, the user can quote phrases and even take screenshots of live-streamed events. Because of the availability of live-streaming video and media coverage of anti-TMT rallies and protests, oftentimes it was not clear whether information sharing tweets were coming from actual people on the ground or people watching events from their computer screens. Penney and Dadas (2014) argue that the affordances of digital technologies underline the hybridity between physical and virtual spaces, where participation in physical activities such as protests carries over to posting about said activities on social media. As far as #WeAreMaunaKea tweets, there were some subtle signs that might have helped to distinguish between the two. During analysis, it appeared that the hashtag #TMTShutdownHQ was used to refer to anti-TMT “headquarters” or areas where protests were taking place. Further research into #TMTShutdownHQ might provide interesting findings into the role of place and how users who are not physically present at events can connect using location-specific hashtags. Differentiating between tweets that appear to be coming from high-risk activities (people on the ground) and low-risk activities (people watching events from their computer) touches on what Vie (2014) refers to as digital activism or
instances of social and political change made possible through digital networks” (n.p.). Some less enthusiastic scholars refer to this action as “slacktivism”, or lazy activism that requires very little sacrifice or physical engagement (Gladwell, 2010; Christensen, 2011). Further exploration might reveal that to people reading through the #WeAreMaunaKea stream, there is little to no apparent difference between tweets coming from people on the ground and tweets coming from people behind a computer.

Additionally, an even closer inspection into the patterns of information sharing during the two-week period might reveal a connection between the specific events and fluctuations in information sharing type tweets. For example, the release of a news article, a gathering, or arrests of protestors atop Mauna Kea could prompt a wave of information sharing tweets. Similarly, further inspection of opinion sharing might find a connection between specific events and fluctuations in opinion sharing type tweets, where users were inspired to share a personal opinion after reading a particular news article or attending an event. The intermixing of information and opinions create layers of complexity which, when mixed with different rationales and actor types, creates numerous avenues for future studies.

**Rationales**

Given the importance of Mauna Kea according to Native Hawaiian culture and cosmology, it is no surprise that a large majority of opinion sharing tweets expressed a sentiment about the cultural significance/sacredness of the mountain. Coders found that tweets in this category often emphasized the connection between Mauna Kea and the Hawaiian people as well as the importance of maintaining the area’s sanctity. Coming in second was foreign occupation, or tweets that expressed a sentiment about the invasiveness of TMT. Third were tweets that expressed a sentiment about the user having an inherent sense of kuleana, or responsibility for
the well-being of Mauna Kea. The last three categories combined, including celebrity involvement, commodification and other, constituted less than 10 percent of tweets. These results suggest that according to Twitter users using the #WeAreMaunaKea hashtag within the two week period, the cultural significance/sacredness of Mauna Kea was the biggest issue in the TMT debate. These results could also be a reflection upon statements made by leaders in the anti-TMT debate, including Lanakila Mangauil and Kahoʻokahi Kanuha. Both have been strong, visible figures in the anti-TMT movement, and often speak on upholding the sacredness of the mountain by protecting and preserving its cultural sanctity. A close inspection of the dates these opinions were shared might reveal that users were prompted by events in which speakers such as Mangauil and/or Kanuha spoke on cultural significance/sacredness. Additionally, a large number of news articles covering the TMT debate specifically mention the cultural significance of Mauna Kea in the eyes of the Hawaiian people. Prompted by particular keywords or themes as presented by news media and or key leaders in the anti-TMT movement, users might have then been inspired to present their own personal opinions on the topic. As with information sharing, future research might look at whether fluctuations in each opinion sharing category correspond to particular events and other external forces that might have encouraged users to express their opinions.

These results also pose another avenue for future research which takes into consideration the significance of actor types and the whether there are correlations between a particular actor type and rationale expressed. Although this study did not set out to measure any correlations between variables, a Chi-square test revealed an association between actor type and rationale. Most notably, there was an association between activism organizations and cultural significance/sacredness. Many activism organizations appeared to have anti-development,
cultural preservation and/or ecosystem conservation agendas and developed their messages accordingly. Figure 3 shows an example of a tweet coming from an activism organization that comments on cultural significance/sacredness.

**Figure 3: Example of a cultural significance/sacredness tweet**

Other than the #WeAreMaunaKea hashtag, this tweet appears as if it could apply to any number of “sacred natural ecosystems” and does not specifically mention Mauna Kea, Hawaiian culture or Hawai‘i in general. It is safe to argue that the activism organizations found the #WeAreMaunaKea hashtag fitting in promoting their anti-development, cultural preservation and/or ecosystem conservation agendas and were able to spread their message by appealing to the anti-TMT audience.

**Actor type**

Prior research has found that journalists are often prominent in hashtag streams during social movements (Lotan et al., 2011). However, seeing as almost 80 percent of #WeAreMaunaKea tweets expressed an anti-TMT stance, the likelihood of journalists and media organizations using the hashtag was low. Rather, journalists might opt to use a more objective hashtag such as #MaunaKea or #TMT. The findings of this study found that rather than journalists, citizens were most prominent with bots and activism organizations coming in second and third. The fact that citizens were the most prominent in the #WeAreMaunaKea stream
suggests that it was citizens that kept the hashtag viral by tweeting #WeAreMaunaKea content. This does not necessarily mean that a large number of individual citizens tweeted content as some citizens were much more active than others. This only means that the majority of #WeAreMaunaKea tweets sent during the two week period were coming from citizens more so than any other actor type.

But perhaps more surprising was the unexpectedly large number of bots using the #WeAreMaunaKea hashtag. Most prominent was the “AlohaVid” bot, which constituted up to 12 separate bot accounts that appeared to be maintained by the same user. Tweets from bots were all marked as information sharing, as they did not constitute an opinion of any kind. But what these bots hoped to accomplish is not altogether clear. Forelle et al. (2015) studied the use of political bots in Venezuela and their role in “beefing up” pro-governmental messages. In their case, bots promoted the social media impact of political leaders by retweeting content from politicians and tweeting innocuous content to drown out oppositional messages. In the context of #WeAreMaunaKea, bots appeared to be attempting to beef up the overall anti-TMT message by mass tweeting the same exact message over several linked accounts. Content posted by these bots were mostly links to YouTube music videos of local/mainstream artists, yet neither the music nor the music video necessarily had a direct connection to the anti-TMT message. Some of the songs make references to Hawai‘i, Hawaiian culture or similar topics but no song specifically mentions Mauna Kea. The only apparent connection was that the artists of said music videos had some involvement in the anti-TMT movement, such as Anuhea Jenkins, Nicole Scherzinger, Maoli and Trevor Hall. Figure 4 illustrates a band of eight bots that mass tweeted a link to the music video “Bang” by Nicole Scherzinger. Although these tweets were not categorized under
celebrity involvement, they do seem to be commending the involvement of celebrities in the #WeAreMaunaKea movement by promoting the music of said celebrities.

Figure 4: Eight “AlohaVid” bots

In this way, bots could have been attempting to extend the reach of celebrity involvement in the movement by pointing users to their music. But why these bots felt the need to disseminate the same exact message across several different accounts is not clear, and possibly suggests that bots were attempting to flood the hashtag stream in hopes that more users would engage with content.

Regardless of their agenda, bot tweets essentially diluted the #WeAreMaunaKea hashtag stream by taking attention away from tweets that shared relevant information or personal opinions about Mauna Kea and TMT. Researchers and journalists who commented on the sheer number of social media posts as a reflection of the virality of the movement should consider the number of bots and other accounts who use “viral” hashtags to push their own agenda.

In their study, Lotan et al. (2011) touch on how different actor types have the ability to engage audiences in different ways. Studies such as Buente and Rathnayake (2015) look at not just the number of tweets sent by any one actor but their prominence and centrality in a network. Studies such as these take into consideration the interactions between users and the influence of certain actors such as celebrities. For example, although celebrity Nicole Scherzinger only sent
out a total of nine tweets, she was very prominent in the #WeAreMaunaKea network because of her prestige. Future studies on actor type should take into consideration this type of data analysis and the relationships between users in the network.

**Use of ʻŌlelo Hawai‘i**

According to the United Nations Educational, Scientific and Cultural Organization, one of the key factors distinguishing an endangered language is its response to new media domains (UNESCO 2003). While scholars have argued that the vitality of a minority language and its relationship to new media is not clear cut, scholar have found that choice of language when using social networking sites such as Twitter often depends on the intended and/or imagined audience (Jones, Cunliffe & Honeycutt, 2013; Litt, 2012). Jones, Cunliffe and Honeycutt found after surveying a sample of Welsh language speakers using Twitter, that more than half of users tweet in a particular language to direct that message to a particular audience. Furthermore, a little more than 40 percent of respondents indicated that their choice of language also depends on the topic of the tweet. In the context of the TMT debate, the anti-TMT message is largely directed at TMT and their affiliates. Perhaps the use of English can be attributed to the fact that the imagined audience for the #WeAreMaunaKea message is pro-TMT. Some common Hawaiian keywords used in tweets included ʻāina (land), keiki (child/children) and mālama (to care for), all of which are very important words with very important meanings for those who maintain a strong Native Hawaiian identity. The use of these and similar keywords could correspond to an appeal to those within the Native Hawaiian community which would then exclude those who do not have a strong connection to these words and their meanings.

In a larger sense, perhaps anti-TMT users are directing tweets at an imagined pro-TMT audience, using exclusive pronouns to establish distance between the “you” that is the pro-TMT
audience and the “we” that is anti-TMT. After all, the hashtag is “We are Mauna Kea,” and whether that “we” is inclusive or exclusive is not clear. If users envision a pro-TMT audience, they might be more likely to speak in English, whereas if users envision an anti-TMT audience, the might be more likely to use ‘Ōlelo Hawai‘i. Figure 5 shows a tweet written completely in ‘Ōlelo Hawai‘i in which the user is addressing Kaho‘okahi Kanuha, a prominent figure in the anti-TMT movement. In the tweet, the user is thanking Kanuha for the hats that are pictured in the linked Instagram photo.

![Twitter screenshot](image)

**Figure 5:** Example of a tweet written completely in ‘Ōlelo Hawai‘i

Although the use of ‘Ōlelo Hawai‘i in this interaction seems trivial, it supports the argument that users are more likely to use ‘Ōlelo Hawai‘i when addressing others within the anti-TMT movement. Kanuha is a ‘Ōlelo Hawai‘i instructor at a Hawai‘i charter school and has been a prominent leader in the movement, often speaking Hawaiian at anti-TMT events and hearings. The user could have chosen to use ‘Ōlelo Hawai‘i knowing that Kanuha and others within the ‘Ōlelo Hawai‘i community would likely understand what he is saying.

The results of the Chi-square test reveal that there was an association between use of some Hawaiian keywords/phrases and citizens. Additionally, all four tweets written completely in ‘Ōlelo Hawai‘i were sent by citizens. Future research could look into who tweets were addressed to when using Hawaiian keywords and phrases and whether use of ‘Ōlelo Hawai‘i can
be associated with a particular imagined audience. For example, if a user were live tweeting an anti-TMT event in hopes of reaching others within the anti-TMT community on Twitter, perhaps he or she would be more likely to use ‘Ōlelo Hawai‘i. Whereas users that express an opinion might be more likely to tweet in English to reach a pro-TMT audience that they assume do not speak Hawaiian. Future studies could also look into the distribution of word length in ‘Ōlelo Hawai‘i, and how writing a phrase in Hawaiian might take up more or less characters than writing the same phrase in English.
CHAPTER 6
CONCLUSION

This study was exploratory and investigated a number of different elements, all of which led to more questions. Findings revealed that the large majority of #WeAreMaunaKea tweets were used for information sharing purposes, and that the availability of live-streaming video and media coverage allowed even users at home to participate in live-tweeting activities. Majority of tweeters that shared a personal opinion expressed a sentiment about the cultural significance/sacredness of Mauna Kea, with a large number of cultural significance/sacredness tweets coming from activism organizations. Overall, most #WeAreMaunaKea tweets came from citizens, but an unexpectedly large number of bots may have used the hashtag to push their own agenda. Lastly, although the large majority of tweets did not use ‘Ōlelo Hawai‘i, majority of tweets that did include ‘Ōlelo Hawai‘i were sent by citizens.

When news media began taking notice of social media activity during the height of the TMT debate, most readers/viewers were left with mere statistics and graphs showing the number of #WeAreMaunaKea posts per day with little to no background on the complexity of social media activity. Some posts are directed at people within the movement while others are directed at a pro-TMT audience. Some posts are made up predominantly of text, while others are photos or links to other media. Some posts have nothing to do with the movement, while others use the hashtag only to tag the relevance of their content. This study revealed that there is much more to social media activity than mere posts per day.

There were a number of limitations to this study, particularly the coding of items. As scraped tweets do not appear on Excel the same way they would appear on Twitter, it was often difficult to deduce meaning from data. For example, classifying actor type was mostly limited to
looking at profile photos and bios, which had to be done by manually looking up the user’s Twitter handle. Furthermore, some users do not provide a lot of information about themselves, and coders often had to make a best guess as to which actor type they were. Identifying use of ‘Ōlelo Hawai‘i is also difficult for a coder who is not a native speaker. When combing through a large amount of data, many researchers refer to machine learning techniques to simplify the data analysis process. I believe this could be successful if done in close collaboration with someone who knows the material and its cultural context. In sum, this study provides numerous opportunities for improvement and future studies and adds to a field of emerging research on social media and social movements.
Works Cited


APPENDIX A: Code Book for #WeAreMaunaKea Tweets

As a coder, you will be given an Excel spreadsheet that includes the following scraped tweet information:

- **User**: the Twitter user’s account handle.
- **Date**: year, month, day and time the tweet was posted
- **Text**: the actual tweet
- **Mentions**: other Twitter users mentioned in the tweet
- **Hashtags**: all hashtags used in the tweet

**LEVEL 1 CODING**

**Stance, Tactics, and Rationale**

1. **Categorize the tweet into one of the categories below according to the stance the tweeter is taking in regards to the construction of TMT on Mauna Kea** *(select single answer)*.
   1. Pro-TMT
   2. Anti-TMT
   3. Neutral

**Pro-TMT stance**

If the tweet appears to express an opinion *in favor* of the construction of TMT on Mauna Kea, the practice of astronomy and/or the use or telescopes on Mauna Kea, it falls into this category. Tweets expressing the positive impact of furthering the study of astronomy would also fall into this category. Tweets in this category also include remarks criticizing those who take an anti-TMT stance. Hashtags that express a pro-TMT stance include #WeSupportTMT.

**Anti-TMT stance**

If the tweet appears to express an opinion *against* the construction of TMT on Mauna Kea, the practice of astronomy and/or the use of telescopes on Mauna Kea, it falls into this category. Tweets in this category also include remarks criticizing supporters of TMT, the improper treatment of sacred Native Hawaiian land, negative environmental impacts of telescopes on Mauna Kea, and general criticizing remarks aimed towards TMT. Hashtags that express an anti-TMT stance include #AoleTMT, #KuKiaiMauna, #TMTShutdown, and #ProtectMaunaKea.

**Neutral**

If the tweet appears to express a neutral opinion on the construction of TMT on Mauna Kea, it falls into this category. This category includes tweets in which two or more obviously contradictory hashtags are used (e.g. #AoleTMT and #WeSupportTMT used in the same tweet).

2. **Categorize the tweet into one of the categories below according to the tactic being employed in the tweet** *(select single answer)*.
   1. Information sharing
   2. Opinion sharing
Information sharing
If the tweet appears to be aimed primarily at sharing information such as announcements about upcoming events, gatherings, rallies, protests and petitions, it falls into this category. This includes attributed quotes and live tweets quoting an attributed speaker.

Opinion sharing
If the tweet appears to be sharing a personal opinion not otherwise attributed to an outside source, it falls into this category.

3. **Categorize the tweet into one or more of the categories below according to the rationale expressed in the tweet (select single answer).**
   1. Celebrity involvement
   2. Foreign occupation
   3. Commodification
   4. Kuleana
   5. Cultural significance/sacredness

Celebrity involvement
If the tweet spreads the word about and/or commends celebrity involvement in the #WeAreMaunaKea movement, it falls into this category. This includes tweets that mention celebrity Twitter handles (e.g. @PrideofGypsies, @NicoleScherzy).

Foreign occupation
If the tweet alludes to the construction of TMT as foreign invasion on native/sacred land, it falls into this category. This includes remarks on the illegal occupation of the United States in Hawai‘i, the overthrow of the Hawaiian kingdom, and Hawaiian sovereignty.

Commodification
If the tweet remarks on the inappropriate use of Mauna Kea for interests such as money-making and tourism, it falls into this category.

Kuleana
If the tweet expresses the tweeter’s sense of responsibility or kuleana in protecting and/or preserving Mauna Kea, it falls into this category. This includes tweets that use the keyword(s) kuleana, responsibility, protection, preservation or hashtags such as #AlohaAina or #MalamaAina.

Cultural significance/sacredness
If the tweet remarks on the cultural importance, significance and/or sacredness of Mauna Kea, it falls into this category. This includes tweets that remark on the relationship and/or connection Native Hawaiians share with Mauna Kea.
LEVEL 2 CODING

Actor Type

4. Categorize the user into one of the categories below according to the actor type that best describes the tweeter (select single answer).
   1. Hawaiʻi mainstream media organizations
   2. Journalists/bloggers
   3. Non-media organizations
   4. Activism organizations
   5. Citizens
   6. Celebrities
   7. Researchers
   8. Bots
   9. Other

Hawaiʻi mainstream media organizations
If the tweeter appears to be a local Hawaiʻi news media organization, they fall into this category. This includes the official Twitter accounts for non-digital media outlets as well as media outlets that exist solely online. Examples: @OiwiTV, @CivilBeat, @MauiNOW.

Journalists/bloggers
If the tweeter appears to be a journalist or blogger working for a media organization or independently, he/she falls into this category. Examples: @MilekaLincoln, @ahofschneider.

Non-media organizations
If the tweeter appears to be a group, club, company, or organization not primarily news oriented, they fall into this category. Example: @NaMeaHawaii.

Activism organizations
If the tweeter appears to be an activism-oriented group, they fall into this category. Examples: @OccHiloMedia, @ProtectMaunaKea, @movementrights.

Citizens
If the tweeter appears to be an ordinary citizen, he/she falls into this category. This includes personal accounts that are not specifically affiliated with an organization. Examples: @michele96744, @SpecialK_808.

Celebrities
If the tweeter appears to be an individual who is famous for reasons unrelated to technology, politics or activism, they fall into this category. Examples: @PrideofGypsies, @NicoleScherzy.

Researchers
If the tweeter appears to be someone who is affiliated with a university or think-tank, he/she falls into this category. Examples: @DrGlenBarry.
Bots
If the tweeter appears to be an automated service that tweets consistent content usually in extraordinary volumes, they fall into this category. Examples: @AlohaVid.

Other
If the tweeter does not clearly fit into any of the above categories, they fall into this category.

LEVEL 3 CODING
Use of ‘Ōlelo Hawai‘i
5. Categorize the tweet into one or more of the categories below according to the use of ‘Ōlelo Hawai‘i in the tweet (select single answer).
   1. No use of ‘Ōlelo Hawai‘i
   2. Use of some Hawaiian keywords
   3. Use of Hawaiian phrases
   4. Written completely in ‘Ōlelo Hawai‘i

No use of ‘Ōlelo Hawai‘i
If the tweet does not include any Hawaiian words, it falls into this category. This does not include the use of a name or proper nouns such as Hawai‘i or Mauna Kea.

Use of some Hawaiian keywords
If the tweet is written primarily in English but includes one or more Hawaiian keywords, it falls into this category. This includes tweets that use the words aloha, ‘āina, mālama, etc. This also includes tweets that include Hawaiian words without proper diacritical marks (ʻokina or kahakō).

Use of Hawaiian phrases
If the tweet includes a Hawaiian phrase made up of two or more Hawaiian words, it falls into this category. Hawaiian phrases may include “Ua mau ke ea o ka ‘āina”, “malama i ka ‘āina”, etc.

Written completely in ‘Ōlelo Hawai‘i
If the tweet is written entirely in Hawaiian (with the exception of the #WeAreMaunaKea hashtag), it falls into this category.
# APPENDIX B: Code Sheet for #WeAreMaunaKea Tweets

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<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>@Genius64</td>
<td>2015-04-29</td>
<td>RT @FreeHawaii: BE THERE THURSDAY - TELL OHANA TO OPPOSE TMT - <a href="http://bit.ly/1jOx68w">http://bit.ly/1jOx68w</a> #WeAreMaunaKea #ProtectMaunaKea <a href="http://bit.ly/1jOx68w">http://bit.ly/1jOx68w</a></td>
</tr>
<tr>
<td>@ProtectMa</td>
<td>2015-04-29</td>
<td>&quot;We are Mauna Kea Pōʻokela i Hoʻomau. &quot; We Are Mauna Kea #Hoʻomau #WeAreMaunaKea #ProtectMaunaKea <a href="http://bit.ly/1lG2oNz">http://bit.ly/1lG2oNz</a></td>
</tr>
<tr>
<td>@RoxiePopC</td>
<td>2015-04-29</td>
<td>RT @ProtectMaunaKea: &quot;We are Mauna Kea Pōʻokela i Hoʻomau. &quot; We Are Mauna Kea #Hoʻomau #WeAreMaunaKea #ProtectMaunaKea <a href="http://bit.ly/1lG2oNz">http://bit.ly/1lG2oNz</a></td>
</tr>
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<td>@Kinket</td>
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<td>RT @ProtectMaunaKea: &quot;We are Mauna Kea Pōʻokela i Hoʻomau. &quot; We Are Mauna Kea #Hoʻomau #WeAreMaunaKea #ProtectMaunaKea <a href="http://bit.ly/1lG2oNz">http://bit.ly/1lG2oNz</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RT @ProtectMaunaKea: We are Mauna Kea Pōʻokela i Hoʻomau. &quot; We Are Mauna Kea #Hoʻomau #WeAreMaunaKea #ProtectMaunaKea <a href="http://bit.ly/1lG2oNz">http://bit.ly/1lG2oNz</a></td>
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