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THE PARALINGUISTIC FUNCTION OF EMOJIS ON TWITTER: A REGION-BASED ANALYSIS OF TWITTER USE IN THE USA

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Yasmin A. Tantawi

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The thesis of Yasmin A. Tantawi was reviewed and approved* by the following:

Mary Beth Rosson
Professor of Information Sciences and Technology
Thesis Advisor

John M. Carroll
Distinguished Professor of Information Sciences and Technology

Carleen Maitland
Associate Professor of Information Sciences and Technology

Mary Beth Rosson
Professor of Information Sciences and Technology
Associate Dean for Graduate and Undergraduate Studies
Director, Graduate Programs

*Signatures are on file in the Graduate School

ABSTRACT

In modern text-based communication, the usage of *emojis* – symbols that indicate an emotional response on the part of the writer – has increased dramatically (Durscheid & Siever, 2017). The emergence and increasing use of emojis can be seen as an extension of the usage of various punctuation marks, such as the question mark, that were introduced into the English language in the fifteenth century (Goldsborough, 2015). Emojis evolved from the usage of emoticons, which are keystrokes that are combined in different ways to convey a facial expression abstractly (Gkoni et al, 2017). Because emojis are graphical symbols that are typically designed to convey emotion, they can be seen as an abstraction of the facial expressions used in face to face communication, but in the context of a text-based conversation.

Despite the apparent paralinguistic functionality of emojis within a text-based conversation, there has been no study of their usage from a general paralinguistic perspective, with the exception of a few studies that investigated their usage by different genders and nations (Algharabali & Taqi, 2018; Lu et al, 2016). In contrast, there has been much research conducted in the paralinguistic aspects of verbal communication with regards to different ethnic groups (Graham & Argyle, 1975). More specifically, no study of emoji usage has examined possible differences in emoji use in rural and urban areas, despite the fact that there is much difference between the living conditions, pace of life, and general outlook on life within both of these types of areas (Sullivan, 1994 & Halfacree, 1995). In addition, the patterns of socializing of urban dwellers is closer in nature to the socialization patterns seen on modern day social networking sites (Wirth, 1938). It is also the case that the different geographic regions of the United States, the south and north; and east and west; have different views with regards to conservatism and sense of place (Bone, 2005; Blevins, 2016; Hibbard, 1999).

In response to the dearth of information about emoji use for different purposes in different settings, my thesis investigates the paralinguistic function of emojis with regards to usage patterns in rural and urban areas across the United States. In order to conduct this project, the Twitter feed from eight cities and near-by rural towns spread throughout the United States were collected using the Twitter public API. The geographic locations for the cities and rural comparisons were chosen to represent major metropolitan areas from each of the four time zones within the United States. Furthermore, I chose one city and one rural town from each time zone to be located in a northern versus a southern location. One hundred tweets were collected from each population center, totaling to 1,600 tweets.

The resulting tweets were filtered to focus only on tweets containing emojis in a two-step process. First, the non-emoji tweet content was analyzed to capture a best-guess as to the context in which the emoji appeared. This step was completed using the topic analysis tool provided by the IBM Watson API. The result is a relatively high-level classification for any emoji-containing tweet with sufficient content (e.g., business, entertainment). Following this first phase of analysis the individual emojis (or sometimes groups of emojis within a single tweet) will undergo content analysis to classify them according to paralinguistic function.

My findings are presented as an exploratory study of different uses of emoji as a function of urban versus rural areas, as well as general portions of the country (e.g., coastal, north versus south). As such, my thesis project complements and enriches earlier studies of emojis use as a function of gender and nationality. I discuss my findings with respect to the types of messaging supported by the Twitter paradigm and how tools might be designed to better support such messaging in different settings.

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Chapter 1

Introduction

The present day has seen a great increase in the popularity of social networking sites such as Facebook, Twitter, LinkedIn, and many similar sites. Indeed, hundreds of such websites are currently in use by millions of people on a daily basis. These social networking sites enable people from disparate geographic locations and walks of life to communicate in an almost instantaneous fashion, and potentially to form social and emotional connections with individuals whom they would never have come to know in the real world (Boyd & Ellison, 2008). However, these relationships are commonly initiated and continued via text-based conversations (often described as text messaging). Such interactions are very different from traditional forms of conversation, which are conducted through spoken language and associated body language; the body language is used in tandem to convey important emotional and social aspects of a conversation and seems to be analyzed in an almost instantaneous fashion by conversation partners (Meeren et al, 2005).

Many emojis have been designed as abstract representations of facial expressions and body language. Because body language and other paralinguistic features are absent in the increasingly popular text-based communication platforms, it is plausible that emojis may be able to express at least some of these paralinguistic functions in text-based online communications (Gkoni et al, 2017). If so, the usage of emojis in text-based online communications may be serving to enhance the emotional content and context of a conversation. When emotional content is expressed in textual form, it uses linguistic written language that is an inherent abstraction of emotional content. Emojis may substitute for the natural body language and facial expressions, which are paralinguistic in nature.

Emojis, which became popular during the mid-1990s, emerged from an earlier form of character-based emotional expressions known as emoticons, which consist of a series of keystrokes that represent a facial expression (e.g., ":-)" can be understood as a smiling face). However, unlike emoticons, which must be created from scratch by the user and may vary significantly in form from user to user, emojis are not modifiable and are merely selected from an emoji keyboard. In addition, emoji keyboards contain more than emotional facial expressions. Nowadays, a myriad of objects, such as everyday objects, currently have emojis associated with them (Alshenqeeti, 2016). Therefore, the scope of the content of emojis and their use cases are currently expanding to include not only the traditional paralinguistic features of facial expressions and other forms of body language; but also, visual descriptions of objects which would otherwise have to be described verbally.

The usage of emojis is currently increasing, and there are currently keyboards on all electronic devices and platforms, through which users can select a particular emoji and insert it within a block of text, just as they would insert a letter, number or punctuation mark (Pohl et al, 2017). Each emoji keyboard is slightly different, depending on the operating system of the device on which it is contained and the platform within which the emoji keyboard is being used. Despite these differences, which are very slight in nature, every distinct emoji is connected to a single Unicode representation that is consistent across all platforms and devices.

Research Problem

The research problem addressed by this research is very pertinent to the current state of communication technologies and the sociological and demographic shifts away from rural areas and towards urban areas which are presently occurring in the United States. In addition, although much previous research has been conducted on the sociological and paralinguistic aspects of

emoji usage, that research has not focused on how the usage of different emojis differs based on one's being situated in an urban or rural area in a single country. Instead, most of the prior research in this field has focused on the frequency of the usage of different emojis, and the differences within these usage frequencies which have been discovered between gender and national groups. This research will be discussed in further detail in subsequent sections. In addition, much previous research has focused on how the usage of emojis can be seen as a substitute for the body language which is constantly being used in traditional, face to face conversation, albeit in a text-based form.

Another aspect of the problem which is being investigated via this thesis project is an exploration of possible differences between the topics discussed and the emojis used by individuals from different geographical regions of the United States can be ascertained. Previous research has revealed that there are many differences between inhabitants of different areas of the United States in terms of their sense of place, political preferences, and many other sociological aspects (Bone, 2005; Blevins, 2016). Therefore, this investigation will also ascertain whether this variable, namely the variable of geographic location, has an effect on the emojis which one uses and the topics which one discusses.

Research Objectives

The main objective of my study is to characterize the paralinguistic function of the emoji usage the Twitter platform. In particular the study will investigate whether the emoji usage patterns in Twitter are consistent with the view that users use these emojis to add an element of emotion and interpersonal connectedness to a conversation which would otherwise be severely lacking in these very important aspects of social conversation. In addition to this goal, this study aims to discover the manner by which these paralinguistic aspects of social conversation are

inserted into online communication techniques. For example, the study examines whether Twitter users of the Twitter platform use a single emoji to represent a single emotion inserted into a tweet; or whether these users use a series of emojis to represent and expand upon the emotional content of a tweet.

Another research objective of this study is to investigate whether and how this paralinguistic usage of emojis is associated to users' residential context, and in particular to whether they are living in an urban area or a rural area. The emojis used by both types of populations will be compared and contrasted; along with the subject matter which was discussed in the tweet containing the emoji in question. As a result of this analysis, I will be able to discover whether urban and rural populations differ in terms of the type of emojis they use to express a certain emotion.

Finally, another objective of this study is to determine whether individuals located in urban areas versus rural areas use emojis to a greater extent in their text-based conversations. Inhabitants of urban areas have been shown to socialize with a large number of groups but to have relatively weak connections to each of these groups is weak; that urban dwellers may also be more accustomed to the new paradigm of socializing on the internet, where personal ties to individuals may be rather weak sense (Wirth, 1938). Because urban dwellers may be more comfortable in their use of Twitter, they might also be more accustomed to using them to their full extent, which would entail their using both traditional verbal text in addition to emojis, which would clarify the emotional content of the verbal text.

Chapter 2

Literature Review

The subject of the paralinguistic features of body language and facial expressions in the real world has been examined to a great extent with regards to how different nationalities and cultures view different forms of body language. As an extension of this paralinguistic aspect of spoken language – but now with regard to the increasingly commonplace written language used to communicate on social networking sites – emoji usage in text-based online communications has also been studied with regards to the differences in their intended use cases by individuals of different nationalities and genders. In addition, the subject of the intended use cases of different emojis has also been studied with regards to their design. The current study, which focuses on the usage of emojis by users of the Twitter social networking site, explores whether there are notable differences in the paralinguistic aspects of emoji-bearing written communications with regards to the urban and rural populations of the United States.

A General Overview of the Twitter Platform

The Twitter social networking site was launched in October, 2006, and was intended to be a platform to support microblogging. *Microblogging* can be defined as a manner by which one quickly updates one's friends and online followers in real time with regards to the mundane activities which one is currently engaging in. This method of communication must be short and succinct so as to fulfill its purpose of rapid social engagement, therefore, the Twitter platform places a limit of each microblog, or tweet, to one hundred and forty characters. The growth of Twitter has risen exponentially from the time of its founding. Indeed, in April of 2007, Twitter

users of this site numbered 94,000 (Java et al, 2007). At the time of writing, the number of users of this social networking site are 326 million (Cooper, 2018).

The topics discussed on the Twitter social networking site are diverse in scope and in content. However, it can generally be said that Twitter topics are those that are circulating within the news media when these tweets are created by individual Twitter users (Kwak et al, 2010). That is, on any given day, it is usually the case that the subject matter of the majority of tweets created on that day are related to newsworthy events occurring on that very same day.

The Paralinguistic Challenges of Text-Based Communication

As a result of the inherent abstractness and lack of imagery in text-based communication, it is impossible to convey the wide range of paralinguistic functions served by body language and facial expressions in face-to-face (FTF) conversation. This is because the paralinguistic features of spoken language are primarily auditory and visual in nature, and verbal text is neither auditory nor visual. The auditory paralinguistic features of language include such aspects as fluctuations in vocal pitch and energy fluctuations in the voice of the speaker (Scherer et al, 1973). The visual paralinguistic features of language include such aspects as raising or lowering one's eyebrows, or the nodding of one's head (Duncan & Fiske, 1979). Because the conversations which occur on social networking sites such as Twitter are textual in nature and contain no form of real-time viewing of the individuals conversing, traditional paralinguistic functions will be absent in such conversations, leading to potential ambiguity or misunderstanding of the emotional content and context of the conversation in question.

Even though the paralinguistic potential of text-based communications is miniscule in size, there are some mechanisms for injecting modest paralinguistic cues by authors of text messages. For example, to emphasize excitement, an author can insert an exclamation mark; to

mark a statement as a question, he or she can add a question mark (Goldsborough, 2015). By so doing, the writer can clarify that a claim which could ambiguously be interpreted as an exclamation or a question is actually an exclamation or a question.

Despite the paralinguistic limitations of text-based communication, authors of Twitter messages can address these challenges to some extent by adjusting the tone of their language when conveying ideas or opinions. Unlike formal written texts, which are used to provide general information to the general public, the messages written by users of social networking sites are conversational in nature. Because of this conversational tone, more emotion-related content is likely to be expressed in social media text messages; this is assumed to be true simply conversational speech tends to contain more emotional content than formal speech (Schandorf, 2012). However, despite the inherent emotionally charged conversations of a social networking message, readers of such messages may still not completely understand the intended emotion conveyed by a message in question, because emotion conveyed by words is more ambiguous than the emotion conveyed by body language. This follows from the fact that the range of facial expressions, body postures and movements that are used to convey emotions are much larger in number than the words available to convey emotions (Ekman, 1993). In other words, there is much more specificity in terms of emotional content when a facial expression is used to convey an emotion as opposed to a word or series of words.

The Paralinguistic Function of Emojis in Text-Based Communication

In addition to providing emotional and paralinguistic cues as part of an otherwise emotionless text-based conversation, emojis can be used to add a visual element to an otherwise imageless text-based conversation (Barbieri et al, 2017). For example, some emojis are used during specific times of the day, or seasons of the year, to call out or emphasize certain aspects of

the time in question. For example, pictures of Santa Claus are popular during the winter; emojis that picture a beach or the sun are popular during the summer. There is also a correlation between these time- or event-specific emojis and the usage of emojis which are more general in nature, such as emojis which pertain to emotions and opinions (Barbieri et al, 2018). Therefore, it seems likely that both types of emojis might be used in conjunction with each other.

A sound case can be made for the claim that emojis are used as a substitute for the body language inherently present in face-to-face conversation, corresponding to a dramatic increase in emoji usage by internet users (Durscheid & Siever, 2017). Despite the novelty of emojis and their use cases, this is not the first time in the history of the English language that new symbols have been invented to convey emotion. Indeed, it is the case that the now mundane question mark and other punctuation symbols were added to the English language in the fifteenth century in an attempt to increase and clarify the emotional context of written speech (Goldsborough, 2015).

As the usage of emojis has increased, the usage of emoticons – a series of keystrokes arranged to visually convey a facial expression – have decreased (Pavalanathan & Eisenstein, 2016). This finding suggests that there is a certain paralinguistic role embedded within emojis that may be superior to that of other forms of digitally-rendered paralinguistic cues, such as emoticons. This finding is corroborated by the fact that the standardization of emojis gives rise to a more exact conveyance of emotional content than the unstandardized nature of emoticons, which may be interpreted in a myriad of ways by individuals.

Another factor pointing to a paralinguistic role of emojis is the fact that, when used within a series of words, emojis are more correctly interpreted with regards to the emotion which they convey than when they are used independently (i.e., without words surrounding them for context; Miller et al, 2017). Therefore, emojis can be said to be intricately associated with language because only when they are used in conjunction with written language are they accurately and correctly understood.

The History and Usage of Emojis

Emojis were invented in Japan in 1999, created as a combination of the Japanese Kanji alphabet and manga art. This combination was seen as a great marketing scheme to encourage the younger generation to buy mobile phones. As a result of the constraints of different mobile phone designs and companies, the design of emojis was eventually standardized into the Unicode standard. At the time of their invention, emojis were seen as an excellent way to allow users to save precious space within their text messages because they would allow users to efficiently communicate a thought while using less data (Lebduska, 2014). This is an interesting historical note because the Twitter social networking site, whose data is being collected in this research study, contains a limit as to the number of characters that can be embedded within a single tweet. Therefore, one can see parallels between the modern state of the Twitter platform and the state of text messaging in at the turn of the twenty first century.

The usage of emojis can also be seen as an attempt to simplify the use of written language while also extending the range of characters available. The alphabet used by English speakers evolved from the logographic alphabet of Egyptian hieroglyphics, which makes use of logographs, or pictorial representations of concepts, to convey a message in writing. It is interesting to note that emojis were invented in Japan, a country whose language uses a logographic system. Therefore, from one perspective it seems that emojis have emerged to simplify the complex nature of alphabet-based written language to include some of its earlier and simpler building blocks that are logographic in nature (Alshenqeeti, 2016). In addition, because the logographic nature of emojis enables emotions to be conveyed in a more forthright fashion than can be done via textual English words, we can see that the appearance of emojis in text-based conversations introduces a paralinguistic substratum of emotion into an otherwise emotionless series of written words.

Gender and Cross-Cultural Differences in Emoji Usage

Previous research has revealed that, in a general sense, emojis are used to convey emotions and simple body language in text-based conversations. However, most of these studies were conducted to ascertain the differences in their usage in different national and gender groups. The current research can be seen as an extension of previous research on differences in body language and gesture usage in real-world, in-person conversations, by individuals of different nationalities, which revealed that different national groups retain their distinct tendencies towards using particular gestures and body language even generations after emigrating from their countries of origin to the United States of America (Graham & Argyle, 1975).

With regards to gender differences in the usage of emojis, one study that investigated gender differences in emoji usage revealed that females are more likely to use emojis to make sure that the emotional message which one is trying to convey in a text is not misinterpreted; males are more likely to use emojis to insert humor into a text-based conversation (Algharabali & Taqi, 2018). A related study found that males and females use different emojis to different degrees; that is, the most popular emojis used by male users are different than the most popular emojis used by female users (for example, men are more likely to use emojis that contain images of hearts, whereas women are more likely to use emojis that contain images of faces; Chen et al, 2017). Females tend to use more emojis in their online communications on social networking sites than males (Herring & Dainas, 2018).

Another study, which investigated how emojis are used differently by Spaniards versus Chinese individuals, revealed that Spaniards use less emojis than Chinese individuals, except in the case of emojis which represent anger, which were used to an equal degree among individuals of both nationalities (Cheng, 2017). It has also been found, through brain imaging techniques, that individuals may perceive an emoji as being ironic if one's neural response to an emoji is opposite

that predicted by the apparent emotion represented in the emoji; whereas individuals may perceive that same emoji as being unironic and direct is one's neural response to the emoji in question is in line with the emotion which is being clearly presented in the emoji in question (Weissman & Tanner, 2018).

The populations of different countries use emojis on the Twitter platform to differing degrees. The country with the highest percentage of tweets containing emojis is Indonesia, whose Twitter users use emojis in 46.5% of their tweets. Paraguay holds the second place in terms of tweets containing emojis, with 37.6% of tweets from that country containing emojis, followed by the Philippines, with 34.6% of tweets emerging from that country containing emojis. Algeria and Qatar rank fourth and fifth, with 33.5% and 32.6% of tweets emerging from those two countries, respectively, containing emojis. Latvia, whose users use emojis in 24.4% of their tweets, is the leader of emoji usage in Europe, closely followed by Spain, with 24.1% of tweets emerging from Spain containing emojis. It is very interesting to note that Japan, the country which invented emojis, is relatively low in usage of emojis, with only 7% of tweets emerging from that country containing emojis. The United States, which is the focus of the analysis of this research study, lags far behind Southeast Asia, South America, North Africa, and the Middle East in terms of its emoji usage: only 10% of tweets emerging from the United States contain emojis (Ljubesic & Fiser, 2016).

The Sociological Differences Between Urban and Rural Populations

Despite the large amount of previous research that has been conducted on emojis and their usage with regards to cross-cultural and gender differences, there has been no previous research that has contrasted emoji usage by individuals living in urban versus rural areas. It is known through previous research that those who live in urban areas have different outlooks on

life than those who live in rural areas. For example, both of these populations have different views with regards to the appropriate amount of personal space, in addition to conflicting views on the presence or absence of natural features, such as trees and shrubbery, outside of their houses (Sullivan, 1994). With regards to socialization, those who live in rural areas are often members of close-knit social circles and are highly involved within the agricultural industry, which they view in a favorable light. Rural dwelling individuals also prefer a pace of life that is slower than that found in urban and suburban areas (Halfacree, 1995).

In contrast, people living in urban areas often see themselves as temporary members of their social group, which tend to be constantly in flux as city dwellers shift from group to group. They oftentimes belong to multiple social groups that may either be exclusive or overlap with other social groups. There is less of a feeling of individuality among urban dwellers than is seen in those who live in the countryside, perhaps because the physical structure of an urban area creates a unified force over its inhabitants, leading all inhabitants to (subconsciously) view themselves as part of a single large mass of individuals (Wirth, 1938). Given the large differences between urban and rural dwellers, it is interesting to speculate whether the manners in which they communicate via computer mediated communication (CMC) is dissimilar, including their communication on platforms that encourage the usage of emojis.

In addition to the dearth of information concerning the CMC behavior patterns of urban and rural dwellers (especially with regards to emoji usage), there is a similar lack of information about CMC patterns associated with individuals who live in different areas of the United States. Previous research on emoji usage has observed international differences with regards to emoji usage, and it is reasonable to expect that a country as large as the United States might reflect some number of distinct “CMC subcultures”. Although such differences may not be of the same magnitude as those seen between nations, it is certainly possible that there are differences to be seen across the vast and diverse population of the United States of America.

As a motivating example, previous research in the field of sociology has revealed that Northern Americans are very different from Southern Americans in terms of their sense of place (Bone, 2005). It is also the case that those Americans who live in the south of the country often have more conservative political stances than their northern counterparts (Blevins, 2016). With regards to the differences between the western part of the United States and other geographic regions of the country, previous research has revealed that those living in this area of the United States often have more liberal views with regards to economics than individuals living in other regions of the country (Hibbard, 1999).

As a result of the general dearth of information regarding different modes of online socialization and corresponding emoji usage, it is interesting to examine the different use cases of these social networking sites and the emojis embedded within them on the part of both types of individuals. As mentioned previously, the usage of emojis introduces a type of artificial body language into an otherwise disembodied and distant conversation. Just as those who live in urban areas have different outlooks on life and different attitudes with regards to socialization than those who live in rural areas, it could very well be the case that both of these population groups have different forms of body language which is used during everyday embodied conversation. By extension, it could be the case that these different forms of body language will be able to be seen in the emoji usage of both of these population groups.

Summary of Literature Review

In summary, the Twitter social networking platform has witnessed extraordinary success from the time of its creation. This social networking platform started out as an unusual way of connecting with other individuals, namely as a result of its usage of microblogs with a relatively small character limit. Usage of emojis on this platform is relatively strong and increasing,

especially in Southeast Asia, the Middle East, and South America; albeit less so in the United States and Japan.

It can also be said that emojis play a very large paralinguistic role in terms of online communications which are text-based as opposed to face-to-face. This is the case since much previous research in this area has revealed that emojis contain a very large paralinguistic substratum and that emojis are often used to insert humor and other emotions into a text-based online conversation. It is also the case, especially among females, that emojis are often used to clarify the emotional tone of such a conversation, much as facial expressions and body language are often used to clarify the tone of a potentially ambiguous verbal statement made in person. These emojis, which were initially created in Japan to draw younger individuals into the mobile phone industry as a result of their popular culture connotations, have now become so ingrained into the online communications of all nations and age groups.

With regards to the differences between urban and rural populations in the United States, the urban dweller's patterns of socialization are much more suited to the type of socializing which occurs on modern day social networking sites, such as Twitter. In contrast, the rural dwellers may be suited to this new form of virtual socialization because that population favors more close-knit social connections and values the naturalness of the real world. In addition, it can be said that those living in the south of the country are, on the whole, more conservative than those living in the north of the country; and that those living in the west of the country are more liberal with regards to economic and business matters than those living in the east of the country.

Research Questions

The first question of this research study is whether there will be a difference in the types of emojis which are used by rural and urban populations. Perhaps certain emojis will be used

more frequently by urban dwellers than by rural dwellers. At the time, it is not known what are the specific emojis which could be used to a greater or lesser degree by both populations since no previous research has been conducted in this specific area.

The second question of this research study is whether there will be a difference in the types of topics which are discussed by both rural and urban populations. These contrasting populations differ in terms of their outlooks on life, political values, and socialization. In addition, it is hypothesized that there will be a difference in the types of topics which are discussed by users from different areas of the country, whether they be rural or urban dwellers, since previous research, which was previously discussed, has shown that individuals living in different geographical regions of the United States have different views on politics and their sense of attachment to a particular place.

The third question of this research study is whether and how the usage of emojis within a tweet will be paralinguistic in nature. Much previous research has revealed a strong paralinguistic component of emoji usage, so I expect to see that replicated in my study. In addition, some research has shown that emojis are currently being used as substitutes for words; and it is even the case that in some instances, entire sentences are now being written with emojis acting as substitutes for words. Therefore, it could be said that these complete substitution of words with emojis act as a form of nonverbal expression of ideas, sentiments, and emotions, albeit to an extreme extent since they are not being clarified by words. In addition, if an emoji is being used within a tweet which contains words, it can be said that the emoji in question is adding a paralinguistic substratum to the words of the tweet.

Chapter 3

Methods

Research Setting

The data for this research study consists of tweets created by Twitter users; it was collected from the Twitter API (developer.twitter.com). The Twitter social networking platform was chosen as the setting of this research study because previous research has revealed that the population of Twitter users is very diverse; Twitter is used by about 326 million individuals, which makes it a very large and meaningful dataset (Cooper, 2018). It was also a convenient source of data because the Twitter API is accessible to the general public.

Sampling Strategy

Because a primary objective of this exploratory research was to examine Twitter usage across different segments of the United States population, a purposive sampling strategy was devised. First, I wanted to sample a broad range of geographic areas; also, because much of the data analysis would involve manual effort, I attempted to limit the number of tweets sampled to a manageable level.

The sampling design considered type of residential area (urban versus rural) and geographic region. Thus, eight major urban centers of the United States were identified (Table 1), along with eight rural towns located outside of the major urban centers in question. The classification of the rural towns was verified via the Rural Health Research Center database (Rural Health Research Center, 2019). This database defines population centers as being rural based on the definitions of rural population centers given by the 2000 United States Census and

an additional classification scheme based on commuting patterns of the inhabitants of these rural towns. According to the 2000 United States Census, an Urbanized Area is defined as a city of 50,000 or more inhabitants. In addition to this classification, the Rural Health Research Center also classifies rural population centers based on the number of people in each population center who have to commute to an Urbanized Area on a daily basis. In this database, a code of 1 or 2 indicates that 30%-50% of town residents commute to an Urbanized Area. It should be noted that the codes of all of the rural towns sampled in this thesis was either 1 or 2, which indicates that these rural towns are in close proximity to Urbanized Areas. This classification based on the number of rural town dwellers who must commute to an Urbanized Area on a daily basis is very interesting since it enables individuals to see how isolated each rural town is and to see how dependent on Urbanized Areas the dwellers of rural towns are for their livelihoods. To implement the desired regional variation, I used a combination of time zone and relative northern or southern location. Thus, four cities (two urban-rural pairs) were chosen from each time zone of the continental United States; one pair was located in the northern part of the time zone and the other in the southern part of the same time zone. Table 1 summarizes the selected cities and their role in the sampling design; it also reports the current population of each city. The average population of the urban cities was 5,134,901.8; the average for the rural towns was 5,729.0.

Location		**Urban**	**Rural**
EST	**North**	New York City, NY Population: 8,175,133	Somers, NY Population: 20,434
	South	Miami, FL Population: 5,502,379	Southwest Ranches, FL Population: 7,345
CST	**North**	Chicago, IL Population: 8,667,303	Channahon, IL Population: 12,560
	South	Houston, TX	Kenefick, TX

		Population: 4,944,332	Population: 667
MST	**North**	Denver, CO Population: 2,374,203	Watkins, CO Population: 653
	South	Phoenix, AZ Population: 3,629,114	Superior, AZ Population: 2,837
PST	**North**	Seattle, WA Population: 3,059,393	Index, WA Population: 178
	South	San Francisco, CA Population: 4,727,357	Diablo, CA Population: 1,158

Table 1.Cities Sampled by Region and Urban versus Rural Type

By collecting a sample of tweets from each of these urban-rural pairs situated throughout the four time zones of the continental United States, it is possible to compare and contrast the topics discussed and emojis used by rural as opposed to urban dwellers; southern versus northern dwellers can also be contrasted. It is also possible to compare differences among the time zones, for example we can contrast “East Coast” versus “West Coast”, or “Coastal” versus “Middle” America. Because the selected rural towns were located in close proximity to the urban centers, we can choose to merge the two locations when comparing geographic region.

The Sampling Process

The Twitter API was accessed by writing a “gettweets.py” Python program (see documentation in Appendix A). This program used the Twitter API Python library to gain access to tweets according to specified geographic coordinates. Each set of geographically-limited tweets was collected and placed into separate files corresponding to each unique location. One hundred tweets were collected from each of these locations; totaling 1,600 tweets overall. The collection script ignored tweets not written in English, as it was important to be able to interpret

the textual context surrounding the tweet. After the collection of these tweets and their containment into separate files, tweets from urban areas were aggregated into one file; and tweets from rural areas were aggregated into another file, in preparation for the first phase of analysis, which focused on comparisons of tweets from urban and rural dwellers.

The geographic coordinates needed for the 16 cities (8 urban-rural pairs) were gathered with the Bounding Box tool, a product of Klokan Technologies (Klokan Technologies, 2019). These geographic constraint data were including as parameters to the TwitterAPI Python package's request, which supports geographic filters. The Bounding Box tool is accessible to the general public via a website; it allows the user to draw a bounding box over any location in the world. After this bounding box is drawn, the coordinates of that location are presented on the screen. A variety of formats are available for the coordinates; and for the purposes of this research study, CSV coordinates were used since this is the type of coordinate which must be input into the request function of the TwitterAPI Python package. The bounding boxes were drawn manually, with the bounding box containing the major delimiters of the population center in question (e.g., roads, housing developments, etc.). This bounding box thus radiated from the central point of the population center in question to its outskirts. In order to visually determine the parameters of the bounding box for the rural towns sampled, the overall visual characteristics of the periphery of the urban cities sampled was examined. As soon as an area on the periphery of each of these urban cities was identified based on the sparsity of roads and housing developments, a bounding box was drawn over the rural town in that area. The rural town was then verified as being rural based on the criteria of the Rural Health Research Center (Rural Health Research Center, 2019).

Data collection took place on the fourteenth of January, 2019, between the hours of 11:45AM and 3:55PM (in Eastern Standard Time). The start and stop time for each period of data collection was timed to correspond roughly to the relative time of day in the four different time

zones, such that each set of tweets was gathered near mid-day. During this time, the "gettweets.py" program was run on the sixteen population centers in the following order:

1. New York City (11:45AM);
2. Somers, NY (11:47AM);
3. Miami (12:03PM);
4. Southwest Ranches, FL (12:07PM);
5. Chicago (12:13PM);
6. Channahon, IL (12:24PM);
7. Houston (12:48PM);
8. Kenefick, TX (12:51PM);
9. Denver (12:58PM);
10. Watkins, CO (1:07PM);
11. Phoenix (1:51PM);
12. Superior, AZ (1:58PM);
13. San Francisco (2:34PM);
14. Diablo, CA (2:38PM);
15. Seattle (2:51PM); and
16. Index, WA (2:58PM)

After the collection of all 1,600 tweets, the emot Python package was used to extract only tweets that contain emojis and to identify the specific emoji which was used in the tweets which contain emojis. Following this, the "analyze.py" Python program, documented in Appendix B, was used to gather summary statistics from the data: total number of tweets, total number of tweets containing emojis, total number of emojis, the ratio of tweets containing emojis to the total number of tweets, and the average number of emojis per tweet. This program also generates a bar graph for each population center that presents each emoji used along with a tally of how many times that emoji was used. In order to reduce clutter in the bar graphs, only emojis that appeared more than once were included in the summary graph.

After these basic statistics were tallied on the datasets from the sixteen different cities and rural towns, a content analysis was conducted on the aggregate of the rural and urban data. A content analysis is a method wherein the overall subject matter or other characteristics of a text is ascertained via a coding scheme; the analysis can be conducted using either manual or computational methods. As datasets have grown in size, computational content analysis has become more popular (Pew Research Center, 2019).

Content analysis was appropriate for this thesis project because its main purpose of this study was to investigate the paralinguistic usage of emojis in tweets. The only way to determine how an emoji is being used in a paralinguistic sense in a tweet that is comprised mostly of text, is to analyze the text in question with regards to its subject matter and use that to infer the role of the emoji(s). It may be possible to classify the subject matter of emoji-bearing tweets, for further analysis of how the subject matter may be associated with emojis' paralinguistic role, including possible emotional content. Furthermore, a grouping of general topics will allow one to determine which emojis are used the most alongside which subject matter groups. This in turn should help to determine whether emojis are used to add emotional cues to text-based conversations, to clarify a potentially ambiguous issue, and so on.

The first step in analyzing the role of the emojis was to identify the general topic of the tweet. The IBM Watson API package was used to do this, considering both the urban and rural data. Specifically, the Natural Language Understanding Service of this package was used for this purpose. Throughout this thesis, when the IBM Watson API is mentioned, it refers to this natural language processing service. To make sure that this package coded the data in a way which is sensible, five percent of the coded data text were manually examined; this inspection led to consistent judgements regarding the topics assigned by the IBM Watson API package.

The program written to conduct the content analysis, which is called "tweet_topics.py" is presented in Appendix C. This program begins by collecting only tweets containing emojis from the entire dataset of tweets; only tweets containing emojis were of interest to meet the research objectives of this study. The program calls the IBM Watson API package to categorize each tweet into one of the twenty-three categories defined in the package. If no text is included in a tweet, that is, if a tweet consists solely of emojis, the tweet in question was categorized into an "unknown" category. When a tweet contained multiple emojis, a single topic was analyzed and assigned as the topic context for all contained emojis.

After this categorization via the IBM Watson API package, I carried out manual coding via two different schemes. The first coding scheme was used to assign paralinguistic functions to the emoji (or emojis) used in a tweet; when a tweet contained more than one emoji, each individual emoji was coded separately. The categories used in this phase had been developed in previous research exploring the content analysis of emojis in tweets (Na'aman et al, 2017). These categories were topic, attitude, gesture, and unknown, defined as follows:

- Topic: an emoji used to clarify the topic of the tweet that contains.
- Attitude: an emoji used to display an attitude that could be inferred about the writer of the tweet with respect to the tweet content.
- Gesture: an emoji that allows the writer of the emoji to graphically convey a gesture that he or she might have wanted to convey in real life.
- Unknown: an emoji where the paralinguistic role is unclear.

After the coding general paralinguistic function of the emojis, a further coding process was used to classify the specific emotion conveyed by emojis that had previously been characterized as an attitude or gesture was conducted. Topic emojis were ignored in this phase, as their function was primarily to illustrate content in the tweet (e.g., a sport image that is part of a tweet about a sport happening). The emotion coding scheme used in this phase was adapted from a previous research paper which focused on the use of emojis to convey emotional content. This coding scheme consists of 11 categories: joy, surprise, praise, pride, love, anger, confusion, anxiety, disapproval, boredom, and playfulness (Sun et al., 2019). The entire coding scheme can be viewed in Appendix D.

Chapter 4

Results

General Patterns of Emoji Usage

Overall, 1,600 tweets were sampled from eight urban cities and eight rural towns (100 per location). Of these, 269 tweets contained emojis (16.8%). There was a total of 628 emojis in this sample, for an average of 2.3. Table 2 documents the distribution of emoji-bearing tweets across all 16 locations sampled. A quick scan of these frequencies suggests a reasonably even distribution, though Southwest Ranches (N=28) and Houston (N=32) seem to stand out as being particularly active.

Location		Urban	Rural
EST	**North**	New York City, NY Emoji-bearing tweets: 13	Somers, NY Emoji-bearing tweets: 16
	South	Miami, FL Emoji-bearing tweets: 17	Southwest Ranches, FL Emoji-bearing tweets: 28
CST	**North**	Chicago, IL Emoji-bearing tweets: 14	Channahon, IL Emoji-bearing tweets: 11
	South	Houston, TX Emoji-bearing tweets: 32	Kenefick, TX Emoji-bearing tweets: 15
MST	**North**	Denver, CO Emoji-bearing tweets: 17	Watkins, CO Emoji-bearing tweets: 19
	South	Phoenix, AZ Emoji-bearing tweets: 12	Superior, AZ Emoji-bearing tweets: 14
PST	**North**	Seattle, WA Emoji-bearing tweets: 13	Index, WA Emoji-bearing tweets: 18
	South	San Francisco, CA Emoji-bearing tweets: 15	Diablo, CA Emoji-bearing tweets: 15

Table 2.Distribution of Emoji-bearing tweets across all 16 locations

Across the complete set of 628 emojis, a total of 165 different emojis were observed. Many of these appeared infrequently. As a threshold, only emojis that appeared at least five times in either the urban or the rural set of 800 tweets have been examined closely. A list of the labels used to refer to these more popular emojis (N=26), along with their corresponding images and frequency, is shown in Table 3. As can be seen in the table, the top ten emojis used by this sample of users were: the face-with-tears-of-joy emoji (70 instances of use); the loudly-crying-face emoji (39 instances of use); the rolling-on-the-floor-laughing emoji (22 instances of use); the red-heart emoji (21 instances of use); the medium-dark-skin-tone emoji (20 instances of use); the smiling-face-with-heart-eyes emoji (20 instances of use); the medium-light-skin-tone emoji (19 instances of use); the female-sign emoji (17 instances of use); the fire emoji (14 instances of use); and the face-blowing-a-kiss emoji (11 instances of use). With respect to the total number of emojis observed, the frequencies of the 26 emojis in the table represent a range of 11.1% (face-with-tears-of-joy) to 0.2% (the three with just 5 instances).

Interestingly, the five most frequent convey reflect what might be considered emotion-bearing cues; four of these are positive (face-with-tears-of-joy, rolling-on-the-floor-laughing, red-heart, smiling-face-with-heart-eyes) and one negative (loudly-crying). The use of these sorts of emojis with emotional content is consistent with what others have reported (Lebduska, 2014). However, the next three emojis are rather different in function, expressing what might be seen as "identity claims" – ethnicity as conveyed by skin tone, or gender. With respect to gender, note that the female-sign emoji is 2 times more frequent than the male-sign emoji. Although the gender composition of the users contributing to the sampled tweets is unknown, this finding may indicate that women are more likely to emphasize identity when writing tweets; alternatively, it may indicate that the issue of female rights or value systems is more likely to occur than issues relating to male identity in Twitter conversations.

Text	Emoji	Instances
face-with-tears-of-joy		70
loudly-crying-face		39
rolling-on-the-floor-laughing		22
red-heart		21
smiling-face-with-heart-eyes		20
medium-dark-skin-tone		20
medium-light-skin-tone		19
female-sign		17
Fire		14
face-blowing-a-kiss		11
kiss-mark		10
thinking-face		10
person-facepalming		9
weary-face		9
clapping-hands		8
dark-skin-tone		8
male-sign		8
woman-dancing		8
raising-hands		8
person-shrugging		7
purple-heart		7
face-with-rolling-eyes		6
light-skin-tone		6
drooling-face		5
Sparkles		5
waving-hand		5

Table 3.Text label, images and frequency of most common emojis

As reported earlier, the IBM Watson API was used classify the topics of tweets that contained emojis. As illustrated in Figure 1, the most commonly discussed topic was that of Society, associated with 99 tweets. Technology and Computing was the second most commonly discussed topic, 78 tweets. Art and Entertainment and Sports were tied, discussed in 71 tweets each. Law, Government, and Politics was the topic of 40 tweets. Business and Industrial was discussed in 32 tweets. Family and Parenting was discussed in 27 tweets. Food and Drink was

discussed in 23 tweets. Health and Fitness was discussed in 20 tweets. Finance was discussed in 15 tweets. Education was discussed in 14 tweets. Pets was discussed in 11 tweets. Automotive and Vehicles was discussed in 10 tweets. Travel was discussed in 9 tweets. Careers was discussed in 8 tweets. Religion and Spirituality was discussed in 7 tweets. Real Estate was discussed in 6 tweets. Both Science and News were discussed in 3 tweets. Both Style and Fashion was and Shopping were discussed in 2 tweets.

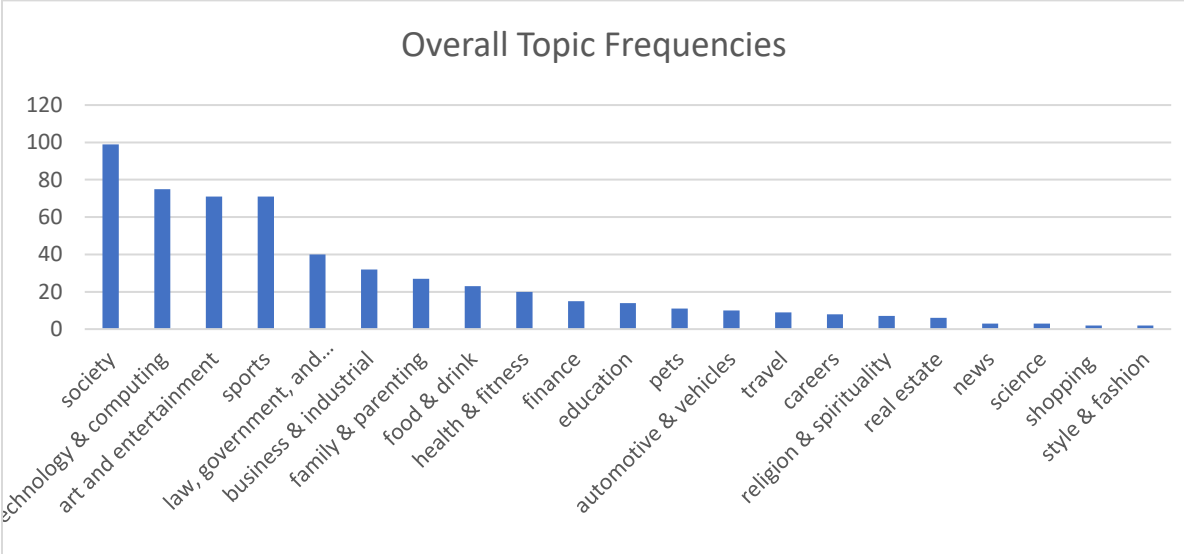

Figure 1.Overall Topic Frequencies

The IBM Watson API was unable to classify 43 tweets; these tweets were attached to a topic that could not be grouped into one of the known categories (tagged as unknown). Manual inspection of these cases revealed that these tweets did not contain any text within them, or contained so little text that it was impossible to ascertain the topic of the tweet in question.

Contrasting Urban versus Rural Patterns of Tweet Usage

To investigate possible differences in whether and how tweets differed according to the rural or urban nature of the users, several analyses were conducted on the files of tweets sampled

from the urban versus rural locations, aggregated across the eight cities of each type. Collapsing across time zones and north-south location, a summary of emoji-bearing versus text-only tweets is in Table 4. A quick review of the comparable frequencies suggests no difference in the number of emoji-bearing tweets sampled from urban versus rural locales: 133 emoji-bearing tweets emanated from urban cities, while 136 came from the rural counterparts. A chi-square test of goodness-of-fit confirmed that emoji-bearing tweets were distributed equally across the two samples ($X2$ (1, N = 1600) = 0.04, *ns*).

	Urban	**Rural**
Emoji-bearing	133	136
Text-only	667	664

Table 4. Tweets containing emojis from urban versus rural locations

The total number of emojis used across the 800 urban tweets was 311, for an average of 16.6% of tweets bearing emojis. The average number of emojis used in the emoji-bearing tweets from urban locations was 2.34. For comparison, in the 800 rural tweets, the total number of emojis was 317, for an average of 17.0% of tweets bearing emojis. The average number of emojis used in the rural emoji-bearing tweets 2.33. Again, these summary data are remarkably similar across the two location types, suggesting that at least with respect to general use of emojis, the urban and rural populations were similar in their usage patterns.

To investigate whether the use of specific emojis might vary across these two types of locales, the overall frequencies were examined separately for the urban versus rural dataset. The results appear in Table 5, which replicates Table 3, except that the overall frequency has been replaced by frequency of each emoji in either the urban or rural set of tweets.

Text	Emoji	Urban (N=311)	Rural (N=317)
face-with-tears-of-joy		43	27
loudly-crying-face		15	24
rolling-on-the-floor-laughing		8	14
red-heart		15	6
smiling-face-with-heart-eyes		14	6
medium-dark-skin-tone		13	7
medium-light-skin-tone		5	14
female-sign		4	13
fire		6	8
face-blowing-a-kiss		0	11
kiss-mark		9	1
thinking-face		4	6
person-facepalming		3	6
weary-face		5	4
clapping-hands		8	0
dark-skin-tone		8	0
male-sign		2	6
woman-dancing		5	3
raising-hands		7	1
person-shrugging		0	7
purple-heart		5	2
face-with-rolling-eyes		1	5
light-skin-tone		1	5
drooling-face		0	5
sparkles		5	0
waving-hand		0	5

Table 5. Text label, images and frequency of emojis by urban, rural location

As see in Table 5, the face-with-tears-of-joy emoji was used most frequently in the urban cities (43 instances); it was also most common for the rural areas, though with 16 fewer instances (27 instances). Note however that the rural sample had higher levels of the rolling-on-the-floor-laughing emoji (14 instances versus 8 instances). At the same time, the loudly-crying-face emoji

was the second most common emoji for the rural area (24 instances), but was used less by urban dwellers (8 instances).

A more abstract comparison can be made by collapsing across groups of similar emojis. For example, all of the top five emojis seem to express emotion of some sort, four of which appear to be positive (numbers 1, 3, 4, 5 in the frequency ordering) and one negative (number 2). Summing up the positive emojis versus the one negative emoji for urban versus rural locations reveals the following: for positive, 80 in the urban set versus 53 in the rural; for negative, 15 in the urban set versus 24 in the rural. A chi-square goodness-of-fit applied to this contingency table of four contrasting frequencies revealed that for these five very popular emojis, the positive-leaning and negative-leaning emojis were not equally distributed in the urban versus rural samples ($X2$ (1, N = 172) = 5.74, $p < .02$).

The only other pattern that stands out is the potential indicators of ethnicity (four emojis that mention skin tone from light, medium-light, medium-dark, and dark). It seems that both populations chose to include emojis referring to skin color, but that the urban dwellers who did so were more likely to include the two darker skin colors (dark skin tone and medium-dark skin tone), while the rural dwellers mentioned the lighter colors (light skin tone and medium-light skin tone). If the skin-color-referencing emojis are grouped into two pairs of darker versus lighter colors, the resulting frequencies by urban versus rural are 6 and 19 for lighter skin; 21 and 7 for darker skin. A chi-square test of goodness-of-fit confirmed that the lighter versus darker skin color emojis were not distributed equally in the urban versus rural tweets ($X2$ (1, N = 53) = 13.75, $p < .001$). Interestingly, the overall frequency of skin-color emojis is similar across the two locations, suggesting that neither living area is more or less focused on personal ethnicity as emphasized by a skin color emoji. However, the more specific comparisons suggest *that for the group of Twitter users who choose to convey their skin color*, the urban dwellers are more likely to include those with darker skin, while the rural dwellers choose emojis with lighter skin.

As described earlier, the emoji-bearing tweets were analyzed with respect to topic, as a step toward better understanding the context in which emojis are expressed and thus what might be the paralinguistic role played by the emojis. These topics were ascertained using the IBM Watson API module for topic analysis. When these frequencies are broken out by urban versus rural dwellers, the frequencies that result are as shown in Table 6.

Topic	**Urban**	**Rural**
Society	48	51
Technology & Computing	51	27
Art & Entertainment	40	31
Sports	23	48
Law, Government, Politics	18	22
Business & Industrial	24	8
Family & Parenting	8	19
Food & Drink	6	17
Health & Fitness	8	12
Finance	5	10
Education	14	9
Hobbies & Interests	9	3
Pets	9	5
Automotive & Vehicles	5	5
Travel	7	2
Careers	2	6
Religion & Spirituality	2	5
Real Estate	2	1
News	2	1
Science	2	1

Shopping	2	0
Style & Fashion	2	14

Table 6. Topic frequencies observed by urban and rural dwellers

A quick scan of the topic frequencies for urban and rural areas points to some possible variations. For example, it appears that Technology & Computing was more prevalent for urban than rural dwellers (51 versus 27), while Sports was more common for rural dwellers. Some of the other topic frequencies are more difficult to compare because the numbers are relatively low. As a result, the remaining analyses use the topic associated with one or more emojis in a more qualitative fashion, namely to help interpreting the emojis' paralinguistic role.

The sampling design also made it possible to examine overall patterns of emoji use as a function of region (four time zones) and the northern versus southern location of the urban-rural pairs. However, organizing the Twitter data in this fashion revealed only a few variations of note.

The 1600 total tweets were comprised of 400 sampled in the eastern time zone (two pairs of urban and rural cities); each other time zone yielded the same number of total tweets. Considering only those that contained at least one emoji, the number of tweets from each time zone were: EST: 74 (18.5%); CST: 72 (18.0%); MST: 62 (15.5%); and PST: 61 (15.3%). These numbers suggest that the tendency to include emojis was quite similar across time zones. Looking in more detail at the number of emojis in each of the emoji-bearing tweets, the average number of emojis per tweet were: EST: 2.2, CST: 2.6, MST: 2.0, PST: 2.4. Again, there seems to be little variation across time zones.

A second regional analysis contrasted tweets from northern and southern cities (i.e., collapsing across both urban-rural and time zone). In this case the number of initial tweets was 800 in each subset, and the number of tweets that contained at least one emoji was 121 for the northern cities and 148 for the southern cities. These summary data suggest that users who live in southern cities might have a stronger tendency to insert emojis into their tweets than those who

live in northern cities because there were 339 total emojis seen in tweets emanating from the south, compared to 289 total emojis seen in tweets emanating from the north. However, an examination of number of emojis per tweet does not extend this finding, revealing an average of 2.39 emojis per emoji-bearing tweet for users from northern cities, but an average of 2.29 for users from southern cities. (t=0.79, *ns*).

Paralinguistic and Emotional Features of Tweets

As summarized in the Methods chapter, the full set of emojis (i.e., from both urban and rural datasets) were analyzed to assess the paralinguistic role they might be playing, considered *in the context of the assigned topic*. This analysis was completed by hand, using a pre-existing code set (Na'aman et al, 2017). The resulting content analysis found instances of three different paralinguistic features across the total set of 526 emojis: attitude, gesture, and topic. The attitude and gesture categories accounted for approximately the same number of emojis (274 had the paralinguistic feature of attitude; 247 of tweets containing emojis had the gesture feature). Considerably fewer (102) used the emojis in a way corresponding to the paralinguistic feature of topic. Recall that "topic" was used to classify emojis that illustrate or emphasize the topic that is expressed in the surrounding text. The 43 emojis found in tweets previously determined to be unclassifiable with respect to topic (e.g., either no or very little contextualizing content) were excluded from this analysis. Examples of emojis classified in each of the three categories appear in Table 7.

	Example emojis classified in each category
Attitude (N=275)	😘💘😍😒😂
Gesture (N=247)	✌✋😳🙅💃
Topic (N=102)	📝🎉📖⚾🏀

Table 7. Examples of emojis manually classified as attitude, gesture or topic

To delve more deeply into the paralinguistic function of the emojis, all emojis that were categorized as Attitude or Gesture were coded at a secondary level, using a set of 11 emotional features drawn from a study of emojis and emotional tone. These features included: Playfulness, Praise, Confusion, Boredom, Surprise, Joy, Pride, Disapproval, Anger, Love, and Unknown. Emojis originally classified as Topic were not included in this secondary analysis, as they were used to simply restate or clarify a tweet topic. The results of the secondary classification appear in Figure 2; 5 emojis could not be classified by one of the 11 features because these emojis did not involve any emotional content and no text was included in the tweets in which they were

contained. Therefore, since there was no verbal context within the tweet, these emojis could not be classified.

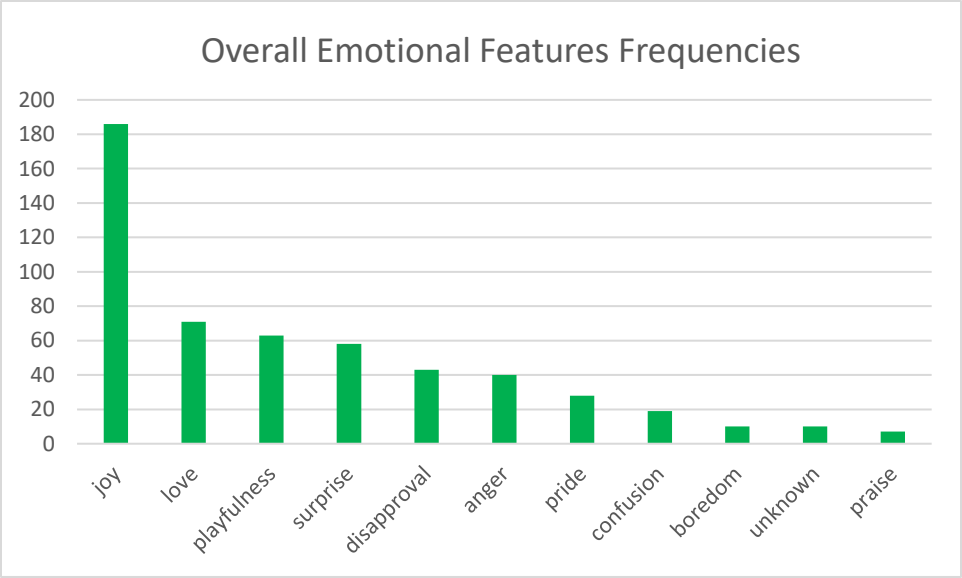

Figure 2. Emotional Features Associated with Attitude and Gesture Emojis

It is interesting to note that positive emotions were in general more common than negative emotions. For example, the top three emotional features are all quite positive, and although Surprise and Pride can have positive or negative connotations, they are typically associated with positivity. Disapproval, Anger, Confusion and Boredom are four features that have a negative connotation, but they are also those that tended to be used at lower frequencies.

Returning to the earlier contrasts of urban versus rural tweets, the same emotional feature coding can be broken down for the two datasets corresponding to urban versus rural locations. Table 8 summarizes this contrast.

Emotional Feature	Urban Tweets	Rural Tweets
Joy	100	86
Love	43	28
Playfulness	39	24
Surprise	26	32
Disapproval	10	33
Anger	10	30
Pride	3	25
Confusion	13	6
Boredom	4	6
Praise	0	7
Unknown	0	10

Table 8. Emotional Features for Emojis Drawn from the Urban versus Rural Datasets

A visual scan of the table suggests different patterns of positive versus negative emotions that echo the earlier pattern reported for specific emoji frequencies – relatively greater positive emotion expressed by urban city dwellers and relatively greater negative emotion by rural dwellers. For example, if the analysis sums together the emotional features that have a clear positive orientation (Joy, Love, Playfulness, Praise) and contrasts these with those that are negatively oriented (Anger, Disapproval, Confusion, Boredom), the sums for positive features is 182 for urban and 145 for rural; the corresponding sums for negatively-oriented features are 37 for urban and 75 for rural. A 2x2 chi-square test of goodness of fit confirms that these positively and negatively oriented features are not distributed evenly across the urban versus rural dataset ($X2$ (1, N = 439) = 17.08, $p < .001$).

In addition to urban versus rural locales, the sampling strategy extracted tweets from different parts of the country (four time zones; northern-southern contrasts within each time zone). Because the number of emotional cues is relatively large (11) and many have rather low observed frequencies, the frequency comparisons for these two location factors considered only

the top seven features; Pride was of particular interest because of its considerable asymmetry in observed frequencies for Urban versus Rural. The resulting two frequency tables (one 7x4 for time zones; 7x2 for north-south) appear as Table 9 and Table 10.

Emotional Feature	**EST**	**CST**	**MST**	**PST**
Joy	35	57	33	49
Love	19	16	9	27
Playfulness	12	18	18	16
Surprise	16	22	7	14
Disapproval	5	12	18	8
Anger	13	13	11	3
Pride	7	10	4	7

Table 9. Top Seven Emotional Features (Attitude and Gesture Emojis) by Time Zone

Emotional Feature	**Northern Cities**	**Southern Cities**
Joy	72	102
Love	30	41
Playfulness	30	34
Surprise	35	24
Disapproval	18	25
Anger	13	27
Pride	16	12

Table 10. Top Seven Emotional Features (Attitude and Gesture Emojis) by North-South

These summaries of emotional features appearing in tweets from different reveal a few specific contrasts, for example the “Disapproval” feature seems to crop up more frequently in the middle-America time zones than in the two coastal time zones; “Joy”, “Love”, and “Anger” seem to be more evident in tweets from southern cities than in northern cities. “Surprise” is more evident in tweets from northern cities than southern cities. However, when groups of features are

considered (e.g., summing across positively oriented versus negatively oriented features as was done earlier for the urban-rural comparison), these contrasts are not statistically reliable.

Summary of Results

In general, the most commonly used emoji was the tears-of-joy emoji; this observation was true regardless of whether and how the dataset was decomposed by type or location of the city. The second most commonly used emoji was the loudly-crying-face emoji. The third most commonly used emoji was the rolling-on-the-floor-laughing emoji.

When considering emoji usage according to urban versus rural residential areas, there were no apparent differences in the relative number of tweets containing emojis, or the average number of emojis per emoji-bearing tweet. However, there did seem to be differences in the frequency of individual emojis and their emotional characteristics.

Both urban and rural areas included the face-with-tears-of-joy emoji as the most frequent emoji, but the relative ordering beyond first position varied. When the frequencies of the top five emojis were grouped according to their positive or negative connotation, the urban areas appeared to be including the four positive emojis (face-with-tears-of-joy, rolling-on-the-floor-laughing, red-heart, smiling-face-with-heart-eyes) more frequently than rural areas, with the inverse true for the expression of the one negative emoji (loudly-crying-face). A similar pattern was observed for the patterns of emotional features coded for tweets that used emojis for either attitudinal or gestural paralinguistic functions – positive emotional features appeared to be more common in the emoji-bearing tweets of urban dwellers than rural dwellers, with the inverse true for negative emotional features.

With respect to topic analysis, the most commonly discussed topic was that of Society, followed by Technology and Computing, Society and Art and Entertainment. However, although

there was some variation in the ordering of topics in the urban versus rural datasets, when examined in more detail, none of these were reliable. As a result, the analysis of topics was used largely for its original function, that is to aid in interpretation of the paralinguistic and emotional character of individual emojis.

At a high level, the paralinguistic function of emojis in the sampled tweets were classified most commonly as Attitude, followed by Gesture, then Topic. This ordering was the same for both the urban and rural tweets containing emojis. With regard to the emotional features found in the tweets which contain emojis, in general, it was found that Joy, followed by Love, followed by Playfulness, were the three most common emotional features.

When considering the tweets as a function of time zone and north-south location in the United States, there appeared to be little variation across region. More total emojis were used by southerners than by northerners, but this difference was not statistically reliable. The number of emojis per tweet containing emojis were almost identical between these two populations.

Chapter 5

Discussion

Answers to Research Questions

The first research question, which dealt with whether or not the emojis used by rural and urban populations are different in nature, cannot be answered completely in the affirmative because it was found that the most popular emoji used by both populations was the tears of joy emoji, followed by the loudly-crying-face emoji. However, because there was a difference in the popularity of the third most popular emoji, which was the smiling-face-with-heart-eyes in urban areas; and a tie between the rolling-on-the-floor-laughing and medium-light-skin-tone emojis in rural areas, it can be said that there is some difference in the usage of emojis by both populations. In addition, because both urban and rural populations had an identical average number of emojis in the tweets that contained emojis, it can be said that both populations use emojis within tweets to the same extent.

The second research question, which dealt with whether there was a difference in the topics discussed by urban as opposed to rural populations, can be answered to some extent in the affirmative because the topic of Technology and Computing was only popular among urban dwellers, and the topic of Sports was only common among rural dwellers. However, despite this seemingly disparate difference between the topics discussed by both populations, it was found that both populations discussed the topic of Society in a very similar number of tweets, with 48 urban tweets pertaining to that topic, and 51 rural tweets pertaining to that topic. In addition, the topic of Art and Entertainment was the third most popular topic for both populations. Therefore, although the most common topic was different for both populations, that being Technology and Computing for urban dwellers and Society for rural dwellers, there was some similarity in the

number of tweets dealing with Society between both populations, and an exact match for the third most popular topic.

The third research question, which dealt with whether there was a difference between the paralinguistic and emotional usage of emojis within tweets, can be answered in the affirmative. Because both urban and rural tweets had an identical ranking of paralinguistic features, that is, the features of attitude, gesture, and topic, in that order, it can be said that both populations are using emojis for similar paralinguistic intentions. However, rural dwellers are more likely to use emojis to convey negative emotions (with respect to the choice of emoji and subsequently coded emotional features), and urban dwellers are more likely to use emojis to convey positive emotions. Both populations are using emojis to convey attitudes regarding a topic, followed by the simulation of gestures within a text-based conversation, followed by an illustration of the topic which is being discussed. However, with regard to the emotional usage of emojis within tweets containing emojis, it was found that both groups were only identical with regards to the most commonly illustrated emotion, which was joy. Both groups differed on the second and third most commonly illustrated emotions, which were love followed by playfulness for urban dwellers; and disapproval followed by surprise for rural dwellers.

Implications

The topic of Society was discussed to a similar extent by both urban and rural populations; one implication might be that the Twitter platform should shift from being viewed as a platform within which users can discuss current events in a succinct manner to a platform wherein users can discuss pertinent societal issues. However, because the topic of Technology and Computing was common only urban dwellers, Twitter should take this into account and make tweets pertaining to this topic more easily accessible to urban users of the platform. In a similar

vein, this same strategy should be used when dealing with the topic of Sports among rural users of the platform since only rural users discussed the topic of Sports to a great extent.

With regards to changes of the design of emojis, especially those emojis which are used to convey a paralinguistic substratum into a text-based conversation, it can be said that, since both urban and rural users of the Twitter platform use emojis mostly for the conveyance of their attitude regarding a topic or to artificially make a gesture within a text-based conversation, emojis that convey facial expressions should be a focus on design improvements.

Let us take the example of the smiling-face-with-heart-eyes emoji. This emoji was shown to be used as an attribution of a positive attitude on the part of the user with regards to the topic which the user in question is discussing. The specific emotional context of this emoji was seen to be that of love or joy, depending on the text surrounding this emoji. However, in the real world, it is impossible for an individual to smile and have their eyes transform into hearts. Perhaps it would be better if this emoji be changed to a smile with tender eyes; or a smiling face with a blush, which is a more realistic image of the emotions of love and joy (Shaver et al, 1996). However, an argument for keeping the smiling-face-with-heart-eyes as it is currently is also logical given that previous research has revealed that familiarity of icons is more conducive to optimal performance in a computer setting than the concreteness of the icon itself (Isherwood et al, 2007). Because Twitter users are already familiar with the smiling-face-with-heart-eyes emoji as it is currently designed, it may be unwise to change it to be more realistic.

Another implication comes from an observation that rural dwellers were more likely to use emojis which are more active in nature, such as the rolling-on-the-floor-laughing emoji, than those conveying only facial expressions, such as the smiling-face-with-heart-eyes emoji. One possible implication is that the more “active” emojis could be made more easily accessible on the Twitter emoji keyboard for Twitter users who reside in rural areas. In addition, because rural dwellers are more likely than urban dwellers to use emojis to introduce negative emotions, such

as disapproval and anger, into a text-based online conversation, emojis which are in line with these negative emotions might be ordered more prominently for Twitter users who live in rural areas. Likewise, more static emojis dealing with facial expressions should be more easily accessible on the Twitter emoji keyboard to those Twitter users who reside in urban areas. These proposed popular emoji types based on demographic region can be attained by placing emojis which fit these characteristics in more salient parts of the emoji keyboard. These salient parts of the emoji keyboard can be measured via user testing methods on current Twitter users from both rural and urban parts of the United States.

Both urban and rural populations were shown to use emojis to convey positive affect. This is the case since both populations use emojis for the emotional feature of joy for the most part. However, because the second most popular emotional feature among rural tweets containing emojis was that of disapproval, along with the fact that three times as many emoji-bearing rural tweets conveyed the emotional feature of anger than their urban counterparts, it appears that emojis are used to convey more negative affect by rural Twitter users than urban Twitter users.

Limitations

This thesis is exploratory in nature. Only a relatively small sample of tweets, that is, 100 tweets from each urban city or rural town sampled, totaling 1,600 tweets overall, were collected. In addition, despite the preponderance of a myriad of social networking sites available on the internet in the present day, only the Twitter social networking site was accessed. Twitter was a reasonable choice, given its popularity and its public API (e.g., in contrast to Facebook), but it limits any inferences to this sort of microblogging platform. In addition, this thesis only looked at tweets emanating from the United States. A more global view of the usage of emojis on Twitter for paralinguistic purposes could be achieved if an international sample of tweets was taken; but

that was beyond the scope of this thesis. In addition, the only user characteristic which was looked at was whether a user was an urban or rural dweller. Other considerations, such as age and gender, were not taken into account in this thesis.

Conclusions/Future Research

In conclusion, it can be said that there is definitely a paralinguistic substratum within the usage of emojis on text-based online communication platforms, most notably Twitter. This is the case since most tweets which contained emojis used the emojis in question to convey the user's attitude towards the topic of the tweet or to supplement the text of the tweet with an artificial gesture. It can also be said that the topics discussed by those Twitter users living in urban and rural parts of the United States are slightly different since the topic of Technology and Computing was discussed primarily by urban dwellers, whereas the topic of Sports was discussed only by rural dwellers. However, both groups discussed the topic of Society to a similar extent. It can also be said that the emojis used by both population segments are almost identical since both the first and second most popular emojis, the tears of joy emoji and loudly-crying-face emoji, respectively, were identical with regards to both urban and rural dwellers. However, the third most popular emoji was different with regards to both population segments, with the smiling-face-with-heart-eyes being the third most popular emoji among urban dwellers; and the rolling-on-the-floor-laughing and medium-light-skin-tone emojis being the third most popular emojis among rural dwellers. This leads to the conclusion that both groups favor emotionally expressive emojis, however, it can be said that rural dwellers favor such emojis which are more active in nature. With regards to the emotional features present among tweets containing emojis, it can be said that, overall, both populations use emojis to generally convey positive emotions, such as joy and love. However, there is a disproportionate amount of negative affect among rural tweets

containing emojis, with large numbers of tweets containing emojis emanating from these population centers being used to convey the attitudes of disapproval and anger.

Future research can be conducted on a larger dataset which contains Twitter users from different parts of the world. The IBM Watson API can be easily used to ascertain the topics discussed within this large dataset since this API requires no manual coding on the part of the user, which would be impossible for such a large dataset. However, the manual coding scheme used in this thesis to ascertain the paralinguistic and emotional intent of the users would be impossible to conduct on such a large dataset. In the future, it could very well be the case that the sentiment analysis technology, which is still in its infancy in the present day, would become more advanced and reliable, which would lead to its potential successful usage for such an analysis (Lin et al, 2018).

Appendix A

Python Script Used to Gather Tweets

```
from TwitterAPI import TwitterAPI
import time
import json

consumer_key=<your_consumer_key>
consumer_secret=<your_consumer_secret>
access_token_key=<your_access_token_key>
access_token_secret=<your_access_token_secret>

api = TwitterAPI(consumer_key, consumer_secret, access_token_key,
access_token_secret)
#get locations from locations file
max_count=100
max_trials=50
floc=open("locations.txt", "r")

for line in floc:
  list=line.split()
  location_name=list[0]
  location_type=list[1]
  location_coordinates=list[2]
  print(location_name, " ", location_type, " ", location_coordinates)

  fname=location_name+".txt"
  fout=open(fname, "a")
  ftype=location_type+".txt"
  fhandle=open(ftype, "a")
  locations={'locations': location_coordinates}

  num_trials=0
  count=0
  while count<max_count and num_trials<max_trials:

    try:
      r=api.request('statuses/filter', locations)
      for item in r:
        if 'text' in item:
          lang=item['lang']
          if 'lang' not in item or lang=='en':
            text=item['text']
            #print('%d: %s: %s \n', count, lang, text)
            item_line=json.dumps(item)
            fout.write(item_line+'\n')
            text_line={"text":text, "location":location_name}
            text_line_json=json.dumps(text_line)
            fhandle.write(text_line_json+'\n')
            count=count+1
            print(count)
```

```
            if count==max_count:
              r.close()
              break

        elif 'disconnect' in item:
          event = item['disconnect']
          if event['code'] in [2,5,6,7]:
            # something needs to be fixed before re-connecting
            # raise Exception(event['reason'])
            print(event['reason'])
            r.close()
            break
          else:
            # temporary interruption, re-try request
            r.close()
            break

    except:
      print('got an exception! retrying...')
      time.sleep(10)
      num_trials+=1
      print("num_trials =", num_trials)

  fhandle.close()
  fout.close()
floc.close()
```

Appendix B

Python Script Used to Analyze Tweets

```
import string
import sys
import json
import emot

fname=input("enter file name: ")
try:
  input=open(fname, "r")
except:
  print("bad file name")
  sys.exit()

count=dict()
tweet_count=0
emojis_count=0
total_emojis_count=0
for line in input:
  tweet=json.loads(line)
  text=tweet['text']
  tweet_count+=1
  d=emot.emoji(text)
  if d['flag']:
    #print(text)
    emojis=d['mean']
    emojis_count+=1
    for e in emojis:
      er=e.replace(':', '')
      total_emojis_count+=1
      if er in count:
        count[er]+=1
      else:
        count[er]=1

print("total tweet count =", tweet_count)
print("total tweets containing emojis count =", emojis_count)
print("total emojis =", total_emojis_count)
print("ratio of tweets with emojis =", float(emojis_count)/tweet_count)
print("average number of emojis per emoji tweet =",
float(total_emojis_count)/emojis_count, '\n')

input.close()
```

Appendix C

Python Script Used to Identify Topic of Tweets

```
import json
import sys
import string
import emot
from ast import literal_eval

from watson_developer_cloud import NaturalLanguageUnderstandingV1
from watson_developer_cloud.natural_language_understanding_v1 import Features,
CategoriesOptions
from watson_developer_cloud import WatsonApiException

natural_language_understanding = NaturalLanguageUnderstandingV1(
  version='2018-11-16',
  iam_apikey=,<your_apikey>,
  url='https://gateway.watsonplatform.net/natural-language-understanding/api'
)

#getting emojis from the tweets
def get_emojis(tweet):
  text=tweet['text']
  emoji_list=[]
  d=emot.emoji(text)
  if d['flag']:
    emojis=d['mean']
    for e in emojis:
      er=e.replace(':', '')
      emoji_list.append(er)
    tweet['emojis']=emoji_list
    return True
  return False

def categorize(natural_language_understanding, tweet):
  best_score=0
  root_topic="unknown"
  category_list=[]
  try:
    tweet_text=tweet['text']
    # Invoke a Natural Language Understanding method
    response = natural_language_understanding.analyze(
    text=tweet_text,
    features=Features(categories=CategoriesOptions(limit=3))).get_result()
    #print(json.dumps(response, indent=2))
    response_json=json.dumps(response)
    response_dict=literal_eval(response_json)
    if response_dict["categories"]:
      category_list=response_dict["categories"]
    best_topic=''
    for l in category_list:
      score=l["score"]
      if score>best_score:
        best_score=score
        best_topic=l["label"]
    if category_list:
      root_topic=best_topic.split('/')[1]
```

```
  except WatsonApiException as ex:
    print("Method failed with status code ", str(ex.code), ": ", ex.message)

  tweet['root_topic']=root_topic
  tweet['best_score']=best_score
  tweet['topic_hierarchy']=category_list
  return

#get input (tweets) and output (annotated tweets) file names
fname_in=input("enter input file name: ")
fname_out=input("enter output file name: ")
try:
  input=open(fname_in, "r")
  output=open(fname_out, "w")
except:
  print("bad file name")
  sys.exit()

#process the tweets
count=0
increment=50

for line in input:
  tweet=json.loads(line)
  #print(tweet["text"])
  has_emojis=get_emojis(tweet)
  if has_emojis:
    #print("has emojis")
    categorize(natural_language_understanding, tweet)
  output.write(json.dumps(tweet) + '\n')
  count+=1
  if count % increment == 0:
    print(count)

input.close()
output.close()
```

Appendix D

Coding Scheme Used to Analyze Paralinguistic and Emotional Attributes of Tweets Containing Emojis

location,topic,emoji,paralinguistic,emotion,urban,region,zone

nyc,society,camera_with_flash,topic,,TRUE,North,EST
nyc,society,lipstick,topic,,TRUE,North,EST
nyc,food_and_drink,sleeping_face,attitude,boredom,TRUE,North,EST
nyc,food_and_drink,sleeping_face,attitude,boredom,TRUE,North,EST
nyc,art_and_entertainment,medium_skin_tone,gesture,pride,TRUE,North,EST
nyc,art_and_entertainment,female_sign,gesture,pride,TRUE,North,EST
nyc,art_and_entertainment,sparkles,topic,,TRUE,North,EST
nyc,society,barber_pole,topic,,TRUE,North,EST
nyc,society,scissors,topic,,TRUE,North,EST
nyc,automotive_and_vehicles,winking_face,gesture,playfulness,TRUE,North,EST
nyc,art_and_entertainment,heavy_heart_exclamation,attitude,joy,TRUE,North,EST
nyc,family_and_parenting,face_with_tears_of_joy,gesture,disapproval,TRUE,North,
EST
nyc,family_and_parenting,loudly_crying_face,gesture,disapproval,TRUE,North,EST
nyc,hobbies_and_interests,face_with_medical_mask,topic,,TRUE,North,EST
nyc,hobbies_and_interests,prince,topic,,TRUE,North,EST
nyc,hobbies_and_interests,medium-
dark_skin_tone,gesture,confusion,TRUE,North,EST
nyc,science,loudly_crying_face,gesture,surprise,TRUE,North,EST
nyc,science,face_with_tears_of_joy,gesture,surprise,TRUE,North,EST
nyc,society,loudly_crying_face,attitude,playfulness,TRUE,North,EST
nyc,art_and_entertainment,rolling_on_the_floor_laughing,gesture,joy,TRUE,North,
EST
nyc,art_and_entertainment,rolling_on_the_floor_laughing,gesture,joy,TRUE,North,
EST
nyc,art_and_entertainment,rolling_on_the_floor_laughing,gesture,joy,TRUE,North,
EST
nyc,society,thinking_face,gesture,confusion,TRUE,North,EST
nyc,unknown,heart_with_arrow,attitude,love,TRUE,North,EST
miami,unknown,heart_with_arrow,attitude,joy,TRUE,South,EST
miami,education,purple_heart,attitude,love,TRUE,South,EST
miami,education,purple_heart,attitude,love,TRUE,South,EST
miami,education,purple_heart,attitude,love,TRUE,South,EST
miami,education,purple_heart,attitude,love,TRUE,South,EST
miami,education,purple_heart,attitude,love,TRUE,South,EST
miami,style_and_fashion,fire,attitude,confusion,TRUE,South,EST
miami,art_and_entertainment,party_popper,topic,,TRUE,South,EST
miami,education,face_with_tears_of_joy,attitude,joy,TRUE,South,EST
miami,health_and_fitness,heart_with_arrow,attitude,love,TRUE,South,EST
miami,health_and_fitness,smiling_face_with_heart-
eyes,attitude,love,TRUE,South,EST
miami,health_and_fitness,smiling_face_with_heart-
eyes,attitude,love,TRUE,South,EST
miami,health_and_fitness,smiling_face_with_open_mouth_&_smiling_eyes,gesture,lo
ve,TRUE,South,EST
miami,health_and_fitness,smiling_face_with_open_mouth_&_smiling_eyes,gesture,lo
ve,TRUE,South,EST
miami,health_and_fitness,grinning_face,gesture,joy,TRUE,South,EST
miami,health_and_fitness,smiling_face_with_smiling_eyes,gesture,joy,TRUE,South,
EST
miami,society,hundred_points,attitude,joy,TRUE,South,EST

```
miami,society,folded_hands,attitude,joy,TRUE,South,EST
miami,law_govt_and_politics,unamused_face,attitude,anger,TRUE,South,EST
miami,sports,victory_hand,gesture,playfulness,TRUE,South,EST
miami,sports,medium_skin_tone,gesture,playfulness,TRUE,South,EST
miami,art_and_entertainment,raising_hands,gesture,joy,TRUE,South,EST
miami,art_and_entertainment,dark_skin_tone,gesture,joy,TRUE,South,EST
miami,art_and_entertainment,fire,attitude,joy,TRUE,South,EST
miami,pets,face_with_tears_of_joy,attitude,joy,TRUE,South,EST
miami,technology_and_computing,smirking_face,gesture,surprise,TRUE,South,EST
miami,technology_and_computing,mobile_phone_with_arrow,topic,,TRUE,South,EST
miami,shopping,thinking_face,gesture,confusion,TRUE,South,EST
miami,business_and_industrial,loudly_crying_face,attitude,joy,TRUE,South,EST
miami,business_and_industrial,smiling_face_with_heart-
eyes,attitude,joy,TRUE,South,EST
miami,unknown,face_with_rolling_eyes,gesture,anger,TRUE,South,EST
miami,law_govt_and_politics,face_with_tears_of_joy,attitude,joy,TRUE,South,EST
miami,law_govt_and_politics,face_with_tears_of_joy,attitude,joy,TRUE,South,EST
miami,law_govt_and_politics,face_with_tears_of_joy,attitude,joy,TRUE,South,EST
miami,law_govt_and_politics,face_with_tears_of_joy,attitude,joy,TRUE,South,EST
chicago,technology_and_computing,smiling_face_with_heart-
eyes,attitude,joy,TRUE,North,CST
chicago,technology_and_computing,smiling_face_with_heart-
eyes,attitude,joy,TRUE,North,CST
chicago,technology_and_computing,smiling_face_with_heart-
eyes,attitude,joy,TRUE,North,CST
chicago,art_and_entertainment,face_with_tears_of_joy,attitude,joy,TRUE,North,CS
T
chicago,art_and_entertainment,face_with_tears_of_joy,attitude,joy,TRUE,North,CS
T
chicago,society,face_with_tears_of_joy,attitude,joy,TRUE,North,CST
chicago,family_and_parenting,loudly_crying_face,gesture,joy,TRUE,North,CST
chicago,family_and_parenting,weary_face,attitude,anger,TRUE,North,CST
chicago,food_and_drink,speaking_head,gesture,playfulness,TRUE,North,CST
chicago,society,pensive_face,gesture,surprise,TRUE,North,CST
chicago,sports,raising_hands,gesture,joy,TRUE,North,CST
chicago,sports,bookmark_tabs,topic,,TRUE,North,CST
chicago,art_and_entertainment,broken_heart,attitude,joy,TRUE,North,CST
chicago,careers,sleeping_face,attitude,confusion,TRUE,North,CST
chicago,technology_and_computing,red_heart,attitude,joy,TRUE,North,CST
chicago,art_and_entertainment,party_popper,topic,,TRUE,North,CST
chicago,art_and_entertainment,two_hearts,attitude,love,TRUE,North,CST
chicago,art_and_entertainment,red_heart,attitude,love,TRUE,North,CST
chicago,finance,person_facepalming,gesture,confusion,TRUE,North,CST
chicago,finance,medium-light_skin_tone,gesture,confusion,TRUE,North,CST
chicago,finance,female_sign,gesture,confusion,TRUE,North,CST
chicago,society,smiling_face_with_sunglasses,attitude,joy,TRUE,North,CST
chicago,law_govt_and_politics,smiling_face_with_sunglasses,attitude,joy,TRUE,No
rth,CST
chicago,law_govt_and_politics,smiling_face_with_smiling_eyes,gesture,joy,TRUE,N
orth,CST
chicago,law_govt_and_politics,relieved_face,attitude,joy,TRUE,North,CST
houston,society,hundred_points,topic,,TRUE,South,CST
houston,society,baseball,topic,,TRUE,South,CST
houston,finance,skull,topic,,TRUE,South,CST
houston,education,broken_heart,attitude,love,TRUE,South,CST
houston,art_and_entertainment,raised_hand,topic,,TRUE,South,CST
houston,art_and_entertainment,dashing_away,topic,,TRUE,South,CST
houston,art_and_entertainment,eye,topic,,TRUE,South,CST
houston,art_and_entertainment,skull,topic,,TRUE,South,CST
houston,art_and_entertainment,crescent_moon,topic,,TRUE,South,CST
houston,art_and_entertainment,crystal_ball,topic,,TRUE,South,CST
```

houston,art_and_entertainment,candle,topic,,TRUE,South,CST
houston,art_and_entertainment,Libra,topic,,TRUE,South,CST
houston,art_and_entertainment,Aquarius,topic,,TRUE,South,CST
houston,art_and_entertainment,open_book,topic,,TRUE,South,CST
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