Italian Vowels

Introduction.

The Italian language is is a part of the Italo-Dalmatian group of languages, which is a part of the Italo-Western grouping of the Romance group of languages. The Romance language group is a member of the Italic subfamily of the Indo-European family of languages (Lewis 2009). Italian is a widely used language, both as a native language and as a second language. It is the eighteenth most spoken language in the world (Srivastava 2007), spoken by about sixty-two million people. About 55,000,000 of these speakers are in Italy (Lewis 2009). Italian is the official language of Italy, as well as San Marino, Croatia, and is also one of the official languages of Switzerland, where it is spoken by a large population. In addition, Italy is spoken by smaller populations in the Vatican State, Australia, Argentina, Belgium, Brazil, Canada, Egypt, France, Germany, Israel, Luxembourg, Romania, Slovenia, South Africa, the United Kingdom, and the United States (Lewis 2009). Italian is written using the Latin alphabet, and the orthography is generally very straightforward (Cieri 2005).

The term "Italian" can refer to both the standard and literary language, as well as the many regional variations and dialects of Italian. Many speakers of Italian, particularly those in Italy, are bilingual speakers of standard Italian and a regional variety (Lewis 2009). Often, speakers in Italy use a regional variety of Italian more often in daily life than they use standard Italian, and it is thought by some that a large portion of the population of Italy does not use the standard form of Italian at all. Many regional

varieties exist throughout all parts of Italy. Regional varieties can vary in many different ways, commonly in lexicon and phonology, and to different extents from the standard dialect and from other regional varieties. For example, the pronunciation of both consonants and vowels are often altered or shifted. Some regional varieties vary only mildly from the standard, and are easily understood by speakers of the standard and other regional varieties. Others, such as Venetian or Neopolitan, can be unintelligible to speakers of other regional varieties (McArthur 1998). Some of these regional dialects, such as Sardinian, that vary a huge amount from the standard are considered by some scholars to be distinct languages, and not simply different dialects or regional varieties of Italian. However, they are not official recognized by most as separate languages from Italian.

The dialects, or regional varieties, of Italian can be generally classified into four main categories of dialects. These main categories can then be further subdivided into more specific groupings. The first main category of is the Northern dialects. This category is subdivided into Venetian and the Gallo-Italian dialects, which are Piedmontese, Ligurian, Lombard, and Emilian (Lepschy 1977). These varieties are unique from the varieties of the other three main categories, because they lie between the Alps at the northern bored of Italy and La Spezia-Rimini Line. La Spezia-Rimini Line runs through the country, separating the Eastern and Western Romance languages. The Northern dialects, part of the Western Romance languages, are particularly different from the other varieties of Italian, due to their exceptionally strong Celtic influence, and share several features with other Western Romance languages that the Eastern Romance languages do not contain (Cieri 2005). Eastern Romance languages

consist of Rumanian, "Dalmatian," and all of the varieties of Italian south of the line, which belong to the three other main categories of Italian, the Tuscan, Central, and Southern dialects (Lepschy 1977).

The Tuscan varieties can be divided into the Central dialect, spoken in Florence, the Western dialect, spoken in Lucca, Pisa, and Livorno, and the Southern variety, spoken around Siena and Arezzo. In northern Latium, parts of Umbria, and the Marches the Central variety of the language is spoken. Finally, the Southern varieties exist in the most southern part of Italy. These varieties are divided into a Neapolitan type, spoken in Latium, Abruzzi, Campagnia, part of Lucania, and northern Puglia, and a Sicilian type, found in the Salentine peninsula, Calabria, and Sicily (Lepschy 1977). This is not a complete list of all existing varieties, however, as many varieties can be sub-divided even further.

The history of the Italian language is incredibly complicated and extremely long, but it is important to have at least some knowledge of a brief version of the history of the language, in order to fully understand the development and significance of differences in the language between the different regions of Italy. In particular, vowels, especially the mid vowels, have a complex history that includes many changes, beginning with the origins in Classical Latin, followed by many shifts in the move towards vulgar Latin, and finally changing to the standard Italian seen today. These changes also occurred differently in different regions (Cieri 2005). Authors such as Giacomo Devoto offer a much more complete history of Italy, focusing on the development of the Italian language from its very origins until the present, in his book from 1978 titled *The*

Languages of Italy. However, for the purpose of this study, a much simpler version of the linguistic history of Italian is sufficient.

Of all the Romance languages, Italian is the most direct descendent of Latin, evolving from Vulgar Latin, or the vernacular Latin spoken at the time (Italian Language Foundation, 2012). Though evidence shows vulgar Latin appearing as early as the 7th century A.D., there is no evidence of Italian emerging before the 10th century A.D, when Italian was seen for the first time in writing in the form of notes and short texts inserted into Latin documents. Throughout the 11th, 12th, and 13th centuries A.D., the early Italian language continued to develop. However, at this point in time, there was no standard or uniform version of the language. Each region used a variety of the language distinct to its area. Because no standard form of the language existed, the regional varieties were apparent in these early notes and shorts texts (Cieri 2005). It is not known exactly when Italian diverged and became distinguishable from vulgar Latin (Clivio and Danesi 2000).

The linguistic history of Italian is strongly tied to the history of Italy and the surrounding area. Therefore, when considering the history of the Italian language, it is important to keep in mind that Italy has historically been a powerful and highly inhabited area of the world, because of Italy's central role in government, religion, and culture as a result of its close link to the Roman Empire. The Roman Empire undeniably had a profound effect on many aspects of the world, which can still be seen even today. In addition, many other peoples have inhabited Italy and the surrounding region throughout history, bringing with them their own languages and almost certainly influencing the emerging Italian language (Cieri 2005). For example, in the earlier

history of Italy, the Etruscans flourished. They had a significant effect of the early

development towards the Italian language, and are unique because of the extensive

inscriptions that exist as linguistic evidence (Devoto 1978). Furthermore, many tribes of

people, such as the Germanic tribes, moved through Italy at different points in history.

When these tribes learned the language, they spoke it with their own accent, which

significantly influenced the pronunciation of the language. It follows that many of the

divisions of regional varieties correspond to the territory of foreign influences such as

these (Vaughan 1915). In addition, because of its power and location, trade and travel,

especially by sea, was heavy throughout Italy which brought new influences on the

language (Devoto 1978).

   The standard dialect of Italian, which is the official language of Italy today, was

based on the Tuscan dialect, and became stadardized in the 14th century A.D. This

dialect was not chosen for the standard because of any linguistic merit it was perceived

to have, but simply because it was made popular at the time by Italian authors Dante

Alighieri (1265-1321), Franceso Petrarca (1304-1374), and Giovanni Boccaccio. The

works of these authors were so popular, both in Italy and in surrounding countries, that

the *volgare* of Florence, or the variety of the language used by the general population,

which was used by these authors became known as the language of literature, or *la

lingua letteraria*. Dante's *The Diving Comedy* was especially widely known, and popular

throughout Europe. The central position and power held in the Tuscan region at the

time, especially in Florence, also added to the perceived prestige of this dialect (Clivio

2000). By the end of the 14th century A.D. the Tuscan dialect of Italian was viewed as a

variety of the language, and was used in literature, politics, and other cultural circles (Ager 2012).

Throughout the next few centuries, the Italian language continued to develop, The standard dialect became more formalized, though regional varieties were still in use by the majority of the population. The first major language academy, founded in about 1583, the Accademia della Crusca, was created to regulate the usage and normalize the lexicon of the standard Italian dialect. The Academy also published the first official Italian vocabulary in 1612 (Hall 1980). The Academy effectively managed the problems that arose due to a need for compromise between the original classical dialect and the quickly changing, commonly used language that continued to develop in the Tuscan region, especially in Florence. The Accademia della Crusca came to be accepted in Italy as the authority in all linguistic matters.

The standard dialect of Italian became the official language of Italy when the country was unified in 1861 (Lepschy 1977). The unification of the country had profound effects on almost all aspects of life in Italy, including politics, social aspects, the economy, and cultural aspects. It also had a huge effect on the linguistic situation. At the time of the unification, only two and a half percent of the population could fluently speak the standard variety, as the majority of the population still used other regional varieties of the language (Lewis 2009). However, after the unification, the standard dialect spread quickly. Many factors facilitated this spread. First, the unified government used almost exclusively the standard, as the official language of the country. In addition, the creation of the national army brought together young men from all around Italy, in an environment where the standard dialect was used. These men then brought the

standard dialect back to their own regions of the country. Next, the standard dialect became the only dialect taught and used in schools throughout the country. This is still the case today (Lepschy 1977). Finally, the standard variety of Italian became the main dialect used in literature and the media (Ager 2012). The use of the standard dialect in television, movies, newspapers, and radio quickly and effectively spread the standard dialect to the entire population of the country (Lepschy 1977). Despite this large spread of the standard dialect, regional varieties remain in heavy use, and are often favored by Italians today.

Clearly, the Italian language is of great interest to linguists for a great many reasons. The rich variety of dialects in such a small area is a unique feature of Italy, that cannot be found elsewhere in Europe (Maiden and Parry 1997). In addition, Italian is special because these dialects vary so greatly from each other, at all linguistic levels, despite each variety still claiming the title of "Italian." The great linguistic diversity and richness of each region of Italy reflects perfectly on the great pride that Italians have for their own regions of the country, and the cultural differences between these regions that make Italy such a beautiful and unique country.

Phonemic Inventory.

The Italian language has twenty one consonant phonemes and seven vowels. There is some disagreement about how many consonant and vowel phonemes exist in the language. For example, some consider the glide to be a consonant, while other consider it to be a high vowel used in a position usually occupied by a consonant. In

addition, some do not distinguish between the "open" and "closed" version of vowels, or /e/ and /ɛ/, and /o/ and /ɔ/ (Krämer 2009). For this study, glides were considered to be a consonant and were not considered in the data. In addition, the open and closed version of vowels were considered to be separate vowels, though it was seen that a distinction was not present for many speakers. Consonant and vowel charts for the language have been included in Appendix C.

The twenty one Italian consonant phonemes are distributed between seven different places of articulation, and six different manners of articulation. All Italian consonants can geminate (Srivastava 2007). The plosives, affricates, and fricatives occur in voiced and voiceless sound pairs, which are contrastive. Many of the consonants of Italian are similar to those of English, such as /m/, /n/, and /b/, while some differ greatly. Other consonants of Italian are similar to English sounds with slight differences, as seen in /p/, which differs from the standard English pronunciation because of the complete lack of aspiration in the Italian pronunciation. It should be noted that the consonants "k," "w," "x," and "y" do not appear in native words of modern Italian, but only in words borrowed from other languages, such as English (Grandgent, 1915).

The vowels of Italian are the focus of this study. Typically, Italian is described as having seven vowels: /i/, /e/, /ɛ/, /u/, /o/, /ɔ/, and /a/. Three are front, unrounded vowels, and three are back, rounded vowels. The low vowel, /a/, is neither front nor back. The two high vowels, /i/ and /u/, are always tense, while the low vowel is always lax. The mid vowels can be tense, which is also called closed, or lax, which is also known as open. For the most part, the Italian vowel system is uncontroversial, with the exception of the

question about the distinction or lack of distinction between the open and closed

versions of the mid vowels. However, it is commonly noted that there is great variation

of the status of this distinction among the different regions and varieties of Italian

(Krämer 2009). In some regions, there is no distinction, while in other places there is an

obvious difference between the open and closed mid vowels. In addition, the distinction

between the open and closed mid vowels can vary between individual speakers, where

some speakers show no distinction, and some show distinction only between the front

mid vowels, /e/ and /ɛ/, or between the back mid vowels, /o/ and /ɔ/. Other speakers

show a distinction between the open and closed vowels in both sets of mid vowels.

Pronunciation of the other vowels can also vary from speaker to speaker, as well as

more generally in different regions of the country.

Diphthongs were not included in this study, because of the complications that can

arise in measuring the formants. In Italian, diphthongs consist of two vowels together.

The first or second vowel in the pair is always /i/ or /u/. Some common diphthongs

include *ia*, *ua*, *ie*, *io*, *oi*, *ie*, *ai*, *ei*, *ue*, *ou*, *iu*, and *ui*. Both vowels in the pair usually

maintain their individual sounds, though one of the vowels usually acts as a semivowel

or glide (Krämer 2009).

Full charts for both the vowels and the consonants can be seen in Appendix C.

Purpose.

The basic aims of this project was to collect speech by native Italian speakers of

three different regions of Italy, so that the vowels of the speakers could be isolated,

analyzed, and compared. It is hoped that the data will show that there are some differences between the vowels of the recorded speakers of Italian from each of the three cities. The specific regional dialect that may or may not be spoken by the individual speakers of different regions will not be explicitly discussed, though the regional variety spoken in the city of the individual speakers, and most likely by the majority of the individual speakers, will clearly have an effect on their speech. This study simply aims to see if there are pronunciation differences of the vowels in different regions of Italy, similarly to the way that pronunciation differences exist among the vowels of native English speakers in the United States.

Since the set of recorded speakers, and therefore the data set, is small, it will not be possible to generalize to the entire population of these cities. Much larger numbers of speakers and more in-depth data sets would be required. However, it is hoped that this study might be a starting point for further research into the differences of vowels between native speakers of Italian from different regions of Italy. It is hoped that further study would be beneficial to the linguistic understanding of the pronunciation of vowels in Italian and the behavior of vowels in general.

Methods.

The data used in this analysis was collected and analyzed by the author, from recordings made in Italy. Three cities were visited, and seven speakers from each city were recorded reading a passage from the well-known book *Il Gattopardo* by Giuseppe Tomasi di Lampedusa, making a total of twenty-one recordings of native speakers of

Italian. Obtaining data from short passages read by a number of native speakers of a

language is a relatively well used method for research that can be used to study many

aspects of languages.

Potential participants for the study were randomly selected to be interviewed

from highly populated, public areas during the day, such as cafes, street corners,

shopping areas, or bus stops. This assured a safe location, where all participants could

remain completely anonymous. No children were asked to participate. Those who were

selected were approached and asked if they were from the city that the author and

researcher was currently in. If they were not from that city, the interview was terminated,

and another potential participant was selected. If they stated that they were from the

city, the person being interviewed was then asked if they would like to participate in a

short interview. All participants were informed that the interviews would be used in a

study of the Italian language, and that the recordings will be used only for the purpose

of research. It was not mentioned, however, that that the study would focus specifically

on vowels. Participation was completely voluntary, and no incentives were offered in

exchange for participation. Potential participants were only be excluded from the study if

they were not a native speaker of Italian from the city of interest or if they denied

participation. Recording of the subjects began at this point only if the participants

expressed verbal consent to be included in the study.

Those participants who chose to be included in the study were then asked a few

basic questions. Only a few, non-identifying, pieces of information were asked for,

including age, occupation, and the birth place of their parents. No information was

gathered that could potentially identify the subjects, such as names or addresses.

Participants were then asked to read the short passage from from *Il Gattopardo* in

Italian. Only audio was recorded, using a small hand-held digital recording device. Each

interview lasted approximately ten to fifteen minutes. Finally, participants were thanked

for their time and cooperation, and any questions about the research or interviews were

briefly answered.

      After the data was obtained, it was transferred to a computed to be processed

and all of the vowels, with some surrounding consonants, from the passage were

transcribed. It was important to determine carefully the correct transcription for the

vowels, as the "open" and the "closed" versions of some of the vowels can be different

for an English speaker to hear. Several different dictionaries were referenced to be

certain about the transcriptions.

      Approximately ten tokens of each of the seven vowels of the Italian language

were selected for analysis from the passage. Tokens were selected based on clear

pronunciation with minimal background noise across all of the speakers. Tokens that

were difficult to hear due to a variety of reasons were left out, so that the data would be

as accurate as possible. Background noise was the most prevalent issue encountered,

since the speakers were all recorded in public areas that were sometimes uncontrollably

noisy. The recordings were then analyzed in Praat. The first, second, and third vowel

formants were obtained for each token of each vowel for all of the recorded speakers.

The tokens for each vowel were averaged for each speaker, and standard error was

determined.

      As per direction of the Swarthmore College Institutional Review Board, the

recordings and data obtained in this study was closely protected. The only records that

were kept at the time of the data collection were the audio recordings and brief notes

about the process of collecting the recordings. The recordings were stored on memory

cards that were kept, along with the recorder and the notes, in the researchers

possession at all times during the collection of the recordings. After the collection

process, all files were transferred to a password protected computer. After the research

and analysis was completed, all data from the recorder and memory cards was

permanently deleted, and notes about the recordings were destroyed. Only the data

gathered from the recordings was kept for use in this study.

      A sample interview and the passage used for the recordings can be seen in

Appendixes A and B.

Data Normalization.

      Normalization of linguistic data is an important part of the process of analyzing

data in any type of study. Normalization of data allows variation caused by physical

differences in individual speakers to be neutralized so that conclusions can be more

accurately drawn. For example, formant values will vary for individuals who have

different sized vocal tracts. This is particularly apparent between male and female

speakers. Normalization attempts to eliminate these issues related to physical

differences, making the data more meaningful (Cieri 2005). Many different methods

exist for normalization. After the data in this study was reviewed for any extreme

anomalies and the means and standard errors for the means were calculated, the data

was then normalized by a very simple method.

First, the lowest and highest values were determined for the first formant of each speaker from each city, representing the highest vowel and the lowest value of that speaker. The same was done for the second formant, showing most front and most back vowels for each speaker. Each value was compared in its non-rounded form to determine the highest and lowest values, but was recorded into the normalized data in rounded form for ease of use. Next, the size of each speaker's vowel range was determined, in terms of highest to lowest vowel and most front to most back vowel. These ranges were averaged for all speakers in each city.

Following this, the distance from the highest vowel and the distance from the most front vowel were calculated for each vowel of each speaker of a city, in hertz. Then, the percentage of each vowel from the highest and the most front vowel were calculated. These values were averaged for all of the speakers of that city. This was repeated for the speakers of each city. At this point, the data was ready to be analyzed further.

Results.

The first city's data to be analyzed was Florence. Full results for individual speakers, and means for the city as a whole, can be seen in the appendices. Brief overviews of only the ranges and highest, lowest, most front, and most back vowels for each speaker are described here.

The first speaker from the city of Florence was found to have an average size of the range from the highest to the lowest vowel of 350Hz, with /i/ being the highest

vowel, at 290±10Hz, and /a/ being the lowest, at 640±30Hz. The speaker's range for the

most front vowel to the most back vowel was found to be 840 Hz, with /i/ as the most

front vowel, with a value of 1900±100Hz, and /ɔ/ as the most back vowel, with a value of

1060±40Hz.

The second speaker from Florence was found to have an average size of the

range from the highest to the lowest vowel of 410Hz, with /i/ being the highest vowel, at

320±10Hz, and /a/ being the lowest, at 730±10Hz. The speaker's range for the most

front vowel to the most back vowel was found to be 1170Hz, with /i/ being the most front

vowel, with a value of 2150±50Hz, and /ɔ/ being the most back vowel, with a value of

980±50Hz.

The third speaker from Florence was found to have an average size of the range

from the highest to the lowest vowel of 350Hz, with /i/ being the highest vowel, at

340±10Hz, and /a/ being the lowest, at 690±10Hz. The speaker's range for the most

front vowel to the most back vowel was found to be 870Hz, with /i/ being the most front

vowel, with a value of 2000±60Hz, and /u/ being the most back vowel, with a value of

1130±50Hz.

The fourth speaker from Florence was found to have an average size of the

range from the highest to the lowest vowel of 370Hz, with /i/ being the highest vowel, at

410±10Hz, and /a/ being the lowest, at 780±20Hz. The speaker's range for the most

front vowel to the most back vowel was found to be 1060Hz, with /i/ being the most front

vowel, with a value of 2200±100Hz, and /u/ being the most back vowel, with a value of

1040±30Hz.

The fifth speaker from Florence was found to have an average size of the range from the highest to the lowest vowel of 190Hz, with /i/ being the highest vowel, at 380±10Hz, and /a/ being the lowest, at 570±20Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1190Hz, with /i/ being the most front vowel, with a value of 2240±20Hz, and /u/ being the most back vowel, with a value of 1050±40Hz.

The sixth speaker from Florence was found to have an average size of the range from the highest to the lowest vowel of 257Hz, with /i/ being the highest vowel, at 390±10Hz, and /a/ being the lowest, at 647±5Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1300Hz, with /i/ being the most front vowel, with a value of 2320±60Hz, and /u/ being the most back vowel, with a value of 1020±50Hz.

The seventh, and last, speaker from Florence was found to have an average size of the range from the highest to the lowest vowel of 220Hz, with /i/ being the highest vowel, at 360±10Hz, and /a/ being the lowest, at 580±10Hz. The speaker's range for the most front vowel to the most back vowel was found to be 800Hz, with /i/ being the most front vowel, with a value of 1800±40Hz, and /o/ being the most back vowel, with a value of 1000±30Hz.

On average, speakers from the city of Florence were found to have an average size of the range from the highest to the lowest vowel of about 307Hz, and a range for the most front vowel to the most back vowel of about 1033Hz. For all speakers, the highest vowel and the most front vowel was /i/, and the lowest vowel was /a/. For two

speakers, the most back vowel was /ɔ/. For four speakers the most back vowel was /u/, and for one speaker the most back vowel was/o/.

Second, the data from Rome was analyzed. Again, full results for each individual speaker, and for the city as a whole, can be seen in the appendices.

The first speaker from the city of Rome was found to have an average size of the range from the highest to the lowest vowel of 260Hz, with /i/ being the highest vowel, at 420±30Hz, and /a/ being the lowest, at 680±20Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1120Hz, with /i/ being the most front vowel, with a value of 2200±40Hz, and /u/ being the most back vowel, with a value of 1080±70Hz.

The second speaker from Rome was found to have an average size of the range from the highest to the lowest vowel of 320Hz, with /i/ being the highest vowel, at 430±20Hz, and /a/ being the lowest, at 750±70Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1500Hz, with /i/ being the most front vowel, with a value of 2540±80Hz, and /ɔ/ being the most back vowel, with a value of 1040±30Hz.

The third speaker from Rome was found to have an average size of the range from the highest to the lowest vowel of 220Hz, with /u/ being the highest vowel, at 420±30Hz, and /a/ being the lowest, at 640±10Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1150Hz, with /i/ being the most front vowel, with a value of 2080±70Hz, and /u/ being the most back vowel, with a value of 930±90Hz.

The fourth speaker from Rome was found to have an average size of the range from the highest to the lowest vowel of 350Hz, with /i/ being the highest vowel, at 470±30Hz, and /a/ being the lowest, at 820±60Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1350Hz, with /i/ being the most front vowel, with a value of 2590±60Hz, and /ɔ/ being the most back vowel, with a value of 1240±20Hz.

The fifth speaker from Rome was found to have an average size of the range from the highest to the lowest vowel of 1600Hz, with /i/ being the highest vowel, at 420±10Hz, and /ɔ/ being the lowest, at 580±20Hz. The speaker's range for the most front vowel to the most back vowel was found to be 900Hz, with /i/ being the most front vowel, with a value of 1800±100Hz, and /u/ being the most back vowel, with a value of 900±100Hz.

The sixth speaker from Rome was found to have an average size of the range from the highest to the lowest vowel of 310Hz, with /u/ being the highest vowel, at 320±30Hz, and /a/ being the lowest, at 630±30Hz. The speaker's range for the most front vowel to the most back vowel was found to be 980Hz, with /i/ being the most front vowel, with a value of 2000±100Hz, and /ɔ/ being the most back vowel, with a value of 1020±20Hz.

The seventh, and final, speaker from Rome was found to have an average size of the range from the highest to the lowest vowel of 310Hz, with /u/ being the highest vowel, at 410±20Hz, and /ɛ/ being the lowest, at 720±20Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1230Hz, with /i/ being the

most front vowel, with a value of 2400±100Hz, and /ɔ/ being the most back vowel, with a value of 1170±40Hz.

On average, speakers from the city of Rome were found to have an average size of the range from the highest to the lowest vowel of about 276Hz, and a range for the most front vowel to the most back vowel of about 1176Hz. For four speakers, the highest vowel was /i/, while for the other three speakers the highest vowel was /u/. The lowest vowel was /a/ for five speakers, while the lowest for the remaining two speakers was /ɔ/ for one speaker and /ɛ/ for the other. The most front vowel for all speakers from Rome was /i/. For four speakers from the city the most back vowel was /ɔ/, and the other three speakers had /u/ as the most back vowel.

Finally, the data from the speakers from Milan was analyzed. Full results for each individual speaker, and for the city as a whole, can be seen in the appendices.

The first speaker from the city of Milan was found to have an average size of the range from the highest to the lowest vowel of 200Hz, with /i/ being the highest vowel, at 360±10Hz, and /o/ being the lowest, at 560±10Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1070Hz, with /i/ being the most front vowel, with a value of 2090±30Hz, and /ɔ/ being the most back vowel, with a value of 1020±40Hz.

The second speaker from Milan was found to have an average size of the range from the highest to the lowest vowel of 190Hz, with /i/ being the highest vowel, at 410±10Hz, and /ɔ/ being the lowest, at 600±20Hz. The speaker's range for the most front vowel to the most back vowel was found to be 800Hz, with /i/ being the most front

vowel, with a value of 1940±60Hz, and /ɔ/ being the most back vowel, with a value of 1140±20Hz.

The third speaker from Milan was found to have an average size of the range from the highest to the lowest vowel of 230Hz, with /i/ being the highest vowel, at 360±10Hz, and /ɔ/ being the lowest, at 590±10Hz. The speaker's range for the most front vowel to the most back vowel was found to be 980Hz, with /e/ being the most front vowel, with a value of 1990±60Hz, and /ɔ/ being the most back vowel, with a value of 1010±20Hz.

The fourth speaker from Milan was found to have an average size of the range from the highest to the lowest vowel of 240Hz, with /u/ being the highest vowel, at 400±20Hz, and /ɔ/ being the lowest, at 640±20Hz. The speaker's range for the most front vowel to the most back vowel was found to be 990Hz, with /i/ being the most front vowel, with a value of 1890±30Hz, and /u/ being the most back vowel, with a value of 900±40Hz.

The fifth speaker from Milan was found to have an average size of the range from the highest to the lowest vowel of 270Hz, with /i/ being the highest vowel, at 390±10Hz, and /ɔ/ being the lowest, at 660±20Hz. The speaker's range for the most front vowel to the most back vowel was found to be 1280Hz, with /i/ being the most front vowel, with a value of 2410±20Hz, and /ɔ/ being the most back vowel, with a value of 1130±30Hz.

The sixth speaker from Milan was found to have an average size of the range from the highest to the lowest vowel of 260Hz, with /u/ being the highest vowel, at 390±10Hz, and /a/ being the lowest, at 650±10Hz. The speaker's range for the most

front vowel to the most back vowel was found to be 1020Hz, with /i/ being the most front

vowel, with a value of 2080±10Hz, and /u/ being the most back vowel, with a value of

1060±50Hz.

The seventh, and final, speaker from Milan was found to have an average size of

the range from the highest to the lowest vowel of 270Hz, with /i/ being the highest

vowel, at 410±20Hz, and /ɔ/ being the lowest, at 680±10Hz. The speaker's range for the

most front vowel to the most back vowel was found to be 1000Hz, with /i/ being the

most front vowel, with a value of 2320±60Hz, and /ɔ/ being the most back vowel, with a

value of 1320±30Hz.

On average, speakers from the city of Milan were found to have an average size

of the range from the highest to the lowest vowel of about 237Hz, and a range for the

most front vowel to the most back vowel of about 1020Hz. For all but two speakers the

highest vowel was found to be /i/, while for the other two speakers the highest vowel

was /u/. The lowest vowel was /ɔ/ for five speakers, while the lowest for the remaining

two speakers was /o/ for one speaker and /a/ for the other. The most front vowel for all

speakers except one was /i/. For the other speaker, the most front vowel was /e/. For

five speakers from the city the most back vowel was /ɔ/, and the other two speakers

had /u/ as the most back vowel.

A full table of results, showing all gathered values for the first, second, and third

formats for each speaker from each city, along with the means and standard errors, can

be seen in Appendix D. In addition, another table of results showing the normalized data

is included in Appendix E.

Discussion.

The results of the analysis show a great number of differences, as well some similarities, between the vowels of the speakers from the three cities that were included in the study. For example, one of the most interesting aspects of the data was the high level of consistency in the data from the speakers from Florence, in comparison to the speakers from Rome and Milan. One was this can be seen is the seven speakers from Florence all had /i/ as their highest and most front vowel, and /a/ as their lowest vowel. The most back vowels did vary between the three back vowels, /u/, /o/, and /ɔ/, but neither Rome nor Milan had more consistency among speakers than Florence did in this regard. All the speakers from Rome had /i/ as the most front vowel, but the highest, lowest, and most back vowels varied. Milan did not have a single vowel that was highest, lowest, most front, or most back for all speakers. Also, the speakers from Florence had relatively consistent spacing for most vowels, which can be seen for each vowel of each speaker in in the percentages of the ranges of the speakers, that represent the distance from the highest and most front vowel. While the relative consistency of the data of the speakers from Florence could be explained away due to chance or errors in the data of the Florence speakers or error in the data of the speakers from the other two cities, it seems possible that speakers from Florence might truly have a vowel space that maintains its shape among a majority of the speakers from Florence. The Florentine dialect is the closest of the regional varieties to the standard dialect, and the standard dialect has a fairly normalized pronunciation of both

its vowels and its consonants. Therefore, because it is likely that a majority of the

speakers from Florence recorded for this study were using the Florentine variety of the

language that is so closely related to the standard dialect, it is reasonable to conclude

that speakers from Florence may have a more formalized pronunciation of vowels than

speakers from other regions.

Another difference between the three cities can be seen in the relative highness

of /a/ for the speakers from Milan. The results of the study show that all but one speaker

from Milan had /o/ or /ɔ/ as the lowest value, while the great majority of speakers from

Rome and Florence had /a/ as the lowest vowel. In fact, all speakers from Florence and

all except for two speakers in Rome were found to have /a/ as the lowest value. This,

and the fact that standard Italian vowel charts always place /a/ lower than all of the

vowels, suggests that speakers from Milan may demonstrate a raising of /a/, to the point

where it is no longer the lowest vowel for the speaker, or is much closer to the next

lowest vowel of the speaker. The placement of /a/ for speakers of Milan in this study

was, on average, higher than the lowest vowel of a speaker by almost 10% of the total

vowel range of that speaker, from the highest vowel to the lowest vowel of the speaker.

In other words, the placement of /a/ in the vowel space of all speakers, except for one,

from Milan ranged from being just slightly higher than the lowest vowel of the speaker,

to being nineteen percent of the speaker's total range higher than the lowest vowel of

the speaker.

Many theories have been presented by a huge number of scholars to attempt to

explain why Italy has so many different varieties of Italian that are so different from each

other and from the standard dialect, despite the fact that they are located so close

together within the country. First, Italy unified very recently in history, in 1860, as

compared to many of the surrounding countries, such as France which became unified

in 834 and Spain which became unified in 1492. This hindered the spread of a standard

dialect previous to the unification, and has allowed for only a relatively short time for the

standard dialect to be spread after the unification of the country. Second, the Apennine

Mountains that run almost the whole length of Italy caused difficulties in communication

between the regions of the country, effectively isolating regions from each other. Next,

the long history in Italy of division into different empires, kingdoms, realms, and regions

resulted in many opportunities for separate languages among different peoples to

develop. Also, there is a long history of usage of Latin in Italy (Cieri 2005). While more

research would need to be done to make definite conclusions, it seems possible, and in

some cases even likely, that some of these theories could be parts of the explanations

for some of the differences seen between the regions in the data of this study, such as

the relative highness of /a/ in speakers from Milan in comparison to the speakers from

Florence and Rome.

In addition, many similarities and differences between the vowels of individual

speakers can be seen in the results of this study. One of the most interesting aspects of

the data was the clear visibility of mergers between the closed /e/ and open /ɛ/, and the

closed /o/ and the corresponding open version, /ɔ/. This merger was clearly apparent in

only a few of the speakers from this study, and there was pattern relating to the city

where the speakers who show this merger were from. The strongest example of this

merger can be seen in a speaker from Florence, who also displays many of the same

characteristics in the height and backness his or her vowels as the other speakers from

Florence, who did not show this merger. This speaker showed a clear merger between

the back vowels, /o/ and /ɔ/. The average F1 value of the speaker for /o/ was 620±20Hz,

and the F1 value of the speaker for /ɔ/ was 630±20Hz. The value for /o/ showed a

distance from the speakers highest vowel of 210Hz, which was 57% of the total range of

the highest to lowest vowel of the speaker, and the value for /ɔ/ showed a distance from

the speakers highest vowel of 220Hz, which was 59% of the total range of the speaker.

More data would be needed to better analyze this merger, so that more strong

examples could be found to assure that this merger exists in a considerably sized

population of Italian speakers. Also, more research could be done to determine which

populations of Italian speakers this merger effects. For example, this merger might

effect speakers in only some regions of Italy. Alternatively, the merger might effect only

males or only females, or be more common in either younger speakers or older

speakers. Or, the merger could be related to socioeconomic status within a community.

Many scholars agree that this merger between the closed and the open vowels of the

language, which are the front /e/ and /ɛ/ and the back /o/ /ɔ/, is in effect in Italy, and

many theories exist as to the causes. A study by Christopher Cieri in 2005 focused on

the causes of this merger in one region of Italy, L'Aquila, and found that age, sex, and

socioeconomic status all played a role in the existence of the merger in that region.

Future research could be done to determine whether the same factors influence the

merger in other regions of Italy, such as the Tuscan region.

Future studies should absolutely be done to expand on this study. Because this

study had a small number of speakers from each city, and therefore a small sample of

data, no definite conclusions or generalizations could be made. In addition, another

problem that arose in this study that may have affected the data and the results is the

lack of a definite method for determining and defining where speakers were from.

Individual speakers may have different definitions of what it means to be from one

region over another, and simply going by where a person was born or where a

speaker's parents are from is inconclusive because where a person or his or her

parents was born does not necessarily correlate to where that person spent most of

their life or even where, or from who, they learned to speak. A more conclusive method

should be determined. Clearly, this study should be looked at as a starting point for

future research.

Conclusion.

This study offered a brief look at the vowels of Italian by seven speakers in each

of three cities of Italy, Rome, Florence, and Milan. Speech was collected from seven

native Italian speakers from each city, data was collected from the recordings, and the

vowels of each speaker were analyzed. This data showed that there is a strong

possibility of differences in pronunciation of vowels between speakers from Rome,

Milan, and Florence, and that there is clearly a great deal of differences in the

pronunciation of vowels among individual speaker. However, since the set of recorded

speakers, and therefore the data set, was so small, it is not possible to generalize the

results of the study to the full populations of these cities, or more generally to the vowel

system of Italian. Therefore, further research should be done with a greater number of

speakers, and speaker data, to further investigate the possibility of pronunciation

differences of speakers from different regions of Italy. In addition, further research

should be done to uncover the possible causes of both the individual speaker

differences, and the differences in pronunciation between the regions.

Appendix A:

Sample Interview

Hello, my name is Lara Hasychak, and I am an American student. I am studying the

Italian language as a part of my senior thesis. I am collecting speech from native

speakers of Italian who are from (name of city). Are you from this city?

(If no: thank participant and end interview.)

(If yes: continue with interview, and begin recording.)

Do you consent to participate in my research on the Italian language? This interview will

consist of a few brief questions and you will be asked to read a short passage. This

interview will be recorded, and the recordings will then be analyzed and used in my

senior thesis.

(If no: stop immediately and delete recording.)

(If yes: continue with recording and interview.)

(Identify participant as male/female, and native speaker of Italian.)

Where are you from? (Should be from the target city.)

How old are you?

What do you do for a living?

Please read this passage from *Il Gattopardo* by Giuseppe Tomasi di Lampedusa.

Thank you for your participation.

(End recording.)

Appendix B.

Passage from *Il Gattopardo* by Giuseppe Tomasi di Lampedusa

Era un giardino per ciechi: la vista costantemente era offesa ma l'odorato poteva trarre

da esso un piacere forte benché non delicato. Le rose *Paul Neyron* le cui piantine aveva

egli stesso acquistato a Parigi erano degenerate: eccitate prima e rinfrollite dopo dai

succhi vigorosi e indolenti della terra siciliana, arse dai lugli apocalittici, si erano mutate

in una sorta di cavoli color carne, osceni, ma che distillavano un denso aroma quasi

turpe che nessun allevatore francese avrebbe osato sperare. Il Principe se ne pose una

sotto il naso e gli sembrò di odorare la coscia di una ballerina dell'Opera. Bendicò, cui

venne offerta pure, si ritrasse nauseato e si affrettò a cercare sensazioni più salubri fra il

concime e certe lucertoluzze morte.

                         - *Il Gattopardo*, Giuseppe Tomasi di Lampedusa
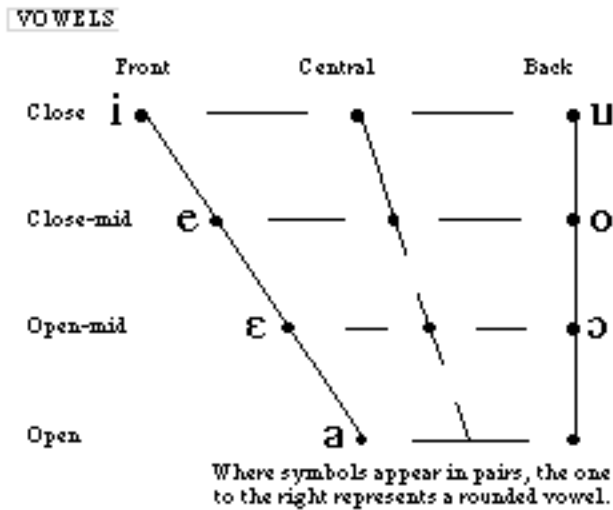
Appendix C.

Italian Vowel and Consonant Charts

Figure 1. Italian Consonants

CONSONANTS
(PULMONIC)

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d				k g			
Nasal	m			n			ɲ				
Trill				r							
Tap or Flap											
Fricative		f v		s z	ʃ						
Affricate				ts dz	tʃ dʒ						
Lateral fricative											
Approximant											
Lateral approximant				l			ʎ				

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

Figure 2. Italian Vowels

VOWELS

Where symbols appear in pairs, the one
to the right represents a rounded vowel.

(Charts from Weinberger, 2011).

Appendix D.

Map of Italy

Figure 3. Map of Regions of Italy and Surrounding Area

(Map from www.mappery.com)

Appendix D.

This section contains full data charts for the results of the analysis. They show all

gathered values for the first, second, and third formats for each speaker from each city,

along with the calculated means and standard errors.

Appendix E.

This section contains the normalized data for each speaker from all three cities. The charts include:

- Values for the highest and lowest vowels for each speaker, along with the size of the speakers range from the highest to lowest vowel. Averages of the seven speakers from each city are also included.

- Values for the most front and most back vowels for each speaker, along with the size of the speakers range from the most front and most back vowel. Averages of the seven speakers from each city are, again, included.

-Average F1 and F2 values for each vowel, along with the distance of each vowel from the speaker's highest and most front vowels. The distances were additionally converted to percentages of the speaker's range. This is shown for each speaker from all three cities. The averages for the seven speakers from each city are also included.