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**ALTERED SPEECH: A CASE-STUDY OF IDENTITY-DRIVEN SPEECH WITHIN A
DISSOCIATIVE IDENTITY DISORDER SYSTEM¹**

by

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**SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FULFILLMENT OF THE
DEGREE OF BACHELOR OF ARTS**

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¹Trigger warning: This paper discusses mental health and abuse.

1 Introduction

The field of sociolinguistics has long been interested in how speech differs across groups. These studies have been focused on how demographic factors like class, race, and geographical region alter speech patterns. However, more recently, the agency of individuals to use language as a tool to construct a certain identity or persona has been highlighted (e.g., Podesva 2007; Eckert 1989; Eckert 2008). These studies are limited due to the nature of their methods, relying on either one individual with a limited scope of characteristics or on a larger group of people with many different variables at play other than identity. The present study aims to address these limitations by centering on a set of unique participants that allow for a more controlled study and larger scope of interest. Specifically, this paper examines identity's role in the sociolinguistic variation of pitch, speech quality, speech rate, and distinct accent markers within one individual with multiple identities (a person with Dissociative Identity Disorder). Despite the clear linguistic differences that have been noted by many studying Dissociative Identity Disorder (DID), there have not been any studies that focus on the phonetic or phonological variables that differ in a single system. Through an examination of these variables, we propose that various elements of personal identity (including gender, age, and sexuality), as well as the alter's function within the system, are what drive the linguistic decisions they make.

2 Literature Review

2.1 Theoretical Overview

The theoretical framework that lays the foundation for this study is established by Eckert (1989), who describes how social identity within defined social groups impacts how people dress, act, and speak. In this ethnographic study, the social relations between “Jocks” and “Burnouts” in a Detroit high school are described. These groups are identified by their

relationship to the institution that controls many aspects of their lives: the school. The “Burnouts,” who are typically described as people who partake in drugs, do not try very hard in school, hang out in the courtyard, and reject the school’s authority. On the other hand, “Jocks” -- who are often involved in school activities like sports, interact with the teachers, and use the school’s resources like the lockers--embrace the authority of the school. In linguistics, this study was groundbreaking for pioneering a theoretical approach that embraced identity as an explanation for linguistic differences. For example, Eckert shows that Burnouts use obscenities, multiple negation, and vowel backing at higher rates than Jocks in order to show their association with the Burnout group. These characteristics are shared with the local working-class dialect, which reflects both how the Burnouts identify socioeconomically as well as to how they are positioning themselves for their lives after high school. As the Jocks attempt to present a professional front, the Burnouts used working-class features to present toughness. Despite the same location and similar races these teens exhibit clear distinctions in their use of language, which charts onto their future directions as either associated with academia or with the working-class. Their language was just one tool they used to assert the ideologies of their group; they also used clothing, behaviors, and styles, all of which show an intentional choice to signal belonging to one group or the other.

Similar in its conception of language and identity, Podesva (2007) finds that linguistic differences based on the presentation of identity can be found within just one individual. Heath, the sole subject of Podesva’s study, is a gay medical student who varies his use of phonetic characteristics that index a gay identity depending on the social context in which he is speaking. Specifically, he uses the non-modal phonation type of falsetto² to create a diva persona when

² Falsetto is a non-modal phonation type which raises the normal pitch of an individual.

interacting with his friends, but not when talking to patients. This study demonstrates the flexibility of identity presentation in just one person. The use of phonation by Heath demonstrates one of the many strategies that individuals use to construct identity. Another strategy is seen in Podesva 2011, the use of a vowel shift from a different dialect or accent. Similarly to Podesva 2007, the use of a Californian vowel shift is used to index a “laid-back” or “partier” gay-persona. As accents are salient aspects of speech, they often pick up associations to the geographical regions they encompass that can then be used to construct identity.

Eckert (1989) and Podesva (2007, 2011) exemplify the shift of sociolinguistics away from conceiving of speakers as bundles of demographic variables and instead assigning them agency in the construction of multifaceted identities. This led to Eckert’s description of sociolinguistic variation as an indexical field, or field of potential meanings, that is utilized by individuals and groups to portray identity (Eckert 2008). This paper demonstrates a shift in view away from analyzing linguistic features based on individuals’ existence in a certain group, but rather their association to that group. This shift in conceptualizing linguistic difference dramatically changes the conclusions that linguistic studies draw. For example, before this difference in theory, Heath’s use of falsetto (from Podesva (2007)) would have been explained by his sexual identity, ignoring the difference in situational usage. In this study we use the theory of variation as an indexical field to analyze differences across identities which exist in the same body but differ in how they wish to present themselves. Previous to Eckert (2008), it would have been impossible to analyze a speaker with DID because every linguistic choice they make is a result of their associations with certain identity features or groups.

2.2 Methodological Background

2.2.1 Phonation

Different types of phonation (or the vibration of the vocal folds) result from altering the state of the glottis to produce speech with different acoustic qualities. Non-modal phonation (phonation different from normal speech) can be contrastive in a language, the result of a voice disorder, or a stylistic choice. Some common types of non-modal phonation are creaky voice, breathy voice, whispery voice, and falsetto voice. Creaky voice is typically associated with a low fundamental frequency (F0), an irregular F0, and a high rate of glottal constriction (Keating et al. 2015). These properties are visible through their main correlates: low F0, high noise, and spectral tilt, with a negative difference between the first and second harmonics signaling laryngealization associated with creaky voice. Keating et al. (2015) note that there are at least six different kinds of creaky voice that all have different acoustic properties. However, all types identified have at least one of the properties outlined above. Therefore, for studies not focused on any particular type of creaky voice, the correlates of prototypical creaky voice can be used for identification.

Breathy voice is another phonation type that has been found to index aspects of identity. Breathy voice is created by slackening the folds, so they do not close completely, resulting in greater airflow (Fulop and Golston 2008). This type of phonation can be distinguished using H1-H2 and H1-H3 (Harmonics 1, 2, and 3), where modal phonation will result in very low values for both data points and breathy voice will have higher values, reflecting its larger open quotient (OQ)³.

More properties of phonation types are established by Gordon and Ladefoged (2001), who provide an overview of non-modal phonation types cross-linguistically. They examine

³ Open quotient is the open portion of the glottal cycle in terms of the whole cycle.

different types of phonation on the simplified basis of vocal fold closure, as visualized in Figure 1.

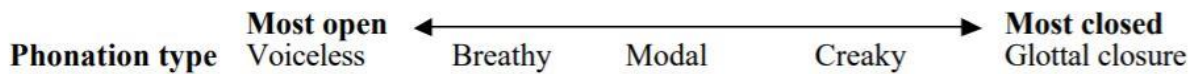


Figure 1. Continuum of phonation types (after Gordon and Ladefoged 2001 pg. 384).

Despite its simplified nature, the continuum above allows for a basic understanding of phonation and demonstrates that phonation is not binary. Using trends from multiple languages, various acoustic measures of phonation can be described. Table 1 organizes the most relevant data from Gordon and Ladefoged (2001).

Phonetic Property	Patterns of Phonation Types
Periodicity	Creaky voice demonstrates aperiodic glottal pulses
Acoustic Intensity	Breathy and creaky voice show decrease in intensity
Fundamental Frequency	Non-modal types generally have lower F0
Formant Frequencies	F1 generally higher in creaky voice F1 generally lower in breathy voice
Duration	Increase in duration for non-modal phonation types

Table 1. Patterns of non-modal phonation types.

While the specifics of the acoustic measure of different phonation types are beyond the scope of this study, they provide an understanding of how different phonation types are created and sound.

Podesva (2013) explores the previous research surrounding non-modal phonation and identity. Several patterns have been found, including the use of creaky voice to display masculinity, most often used by men. On the other side, falsetto voice, which allows for a higher

F0, is often related to femininity because it is used more often by women and because women often have higher F0. Podesva points out flaws in these overarching trends accounted for solely by gender by noting other studies that have conflicting data. For example, the use of creaky voice is more common among women in California than men. Additionally, some African American men use falsetto voice, but not to index femininity. Therefore, Podesva argues that because non-modal phonation types are specific to certain cultures, they cannot be viewed just in terms of gender or race.

The methods employed in Podesva (2013) provide a framework for how similar studies can be replicated to examine other characteristics. The study looks at 150 sociolinguistic interviews of 32 people in the Washington D.C. area. Half of the participants are white while the other half are African American, with a wide range of ages. Each syllable was coded for phonation type, with six types appearing: modal, creaky, falsetto, breathy, whispery, and harsh voice. Each syllable was also coded for sex, race, age, and individual. Then, the percentage of each phonation type in each Intonational Phrase (IP) was calculated. Podesva found that creaky and non-modal voice are used in reported speech and to show disagreement toward a statement, therefore “othering” the speaker from the original speech. Women use significantly more creaky voice than men, which Podesva posits might serve to index an educated, urban female persona. African American women use significantly more falsetto than any other group, which seems to relate to negative evaluations relating to racism and gentrification. Finally, white men use much less whispery voice than any of the other groups. This study demonstrates how phonation can be used to express a wide variety of identity presentations.

2.2.2 Methodological Background: Pitch

Pitch is the rate at which the vocal folds vibrate. Pitch can be altered by tightening the vocal folds or relaxing them, resulting in higher and lower pitches respectively. This is because when vocal folds are farther apart, like they are when they are relaxed, they take longer to vibrate together, causing a lower pitch. Because men typically have larger vocal tracts, they have lower fundamental frequencies or pitch (Dacakis 2002). This natural difference has led to an association between a low pitch and masculinity, while a higher pitch is associated with femininity. Interestingly, however, gender-based differences in pitch found cannot be totally explained by differences in vocal tract size (Whiteside 1996). This means that the average person also uses pitch as a means of expressing their gender identity. Gelfer & Schofield (2000) study the perception of pitch in relationship to male-to-female transgender speakers. The study looks at the perception of gender using the speech of 15 transgender individuals and nine controls (three men, six women).⁴ The results show that a lower fundamental frequency is identified as masculine while a higher fundamental frequency is identified as feminine. Additionally, for the voices identified as women, there was a greater number of upward shifts in pitch.

2.2.3 Methodological Background: Speech Rate

Another factor that could be used to demonstrate gender and gender identity is speech rate. Whiteside (1996) examined the speech of three men and three women with British General Northern accents and found that men had higher rates of articulation than women. The speech data used was from ten repetitions of five sentences. These recordings were then measured for length, with all pauses being subtracted from the overall length. The length was then divided by the total number of syllables to get the rate. While this study found a significant difference

⁴ Participants read the Rainbow Passage (Fairbanks, 1960) for these recordings.

between men and women, with men having higher speech rates, other, similar studies have been inconclusive. Borsel and De Maesschalck (2009), for example, performed a similar study on 100 men, 100 women, and 28 male-to-female transgender participants (all Dutch speakers). No significant differences were found between the groups. The authors compiled a list of the studies done thus far on the topic of speech rate and gender across languages (pg. 681) and found that there was either no significant difference in speech rate by gender or that men showed a faster speech rate than women.

2.2.4 Methodological Background: Accents

The subjects for this study have several accents, including Received Pronunciation (RP), Californian, and Cockney. These accents are believed to provide additional means to represent identity. Previous research, such as Podesva (2011), has found that accents can be used to project a certain personality. In his study, Podesva argues that features of the Californian accent index associations of ‘fun’ and ‘laid-back.’ Due to these associations, the subject of his study, Regan, adopts the California vowel shift to construct a gay identity that is closely linked with his ‘partier’ personality. This demonstrates that the use of a particular accent may be tied to its societal perception.

Other studies demonstrate the perception of certain British accents. Bishop, Coupland, and Garrett (2005) conducted a perception study on accents within the United Kingdom and found that RP, which is sometimes called the Queen’s English, is perceived as more attractive and prestigious. RP is known as the English used on the British Broadcasting Network (BBC) and uses features such as vowel lengthening. Conversely, urban vernaculars (Birmingham, Liverpool, Glasgow) have low levels of attractiveness and prestige. The Cockney accent is also

rated low for both attractiveness and prestige. This accent is highly recognizable and makes use of features like th-fronting and h-dropping.

A later study by Coupland and Bishop (2007) supports the previous findings. The authors note that the highest rated accent in terms of social attractiveness is the accent identical to the rater, followed by RP. However, if just the data from respondents aged 15-24 is considered, there is a shift away from RP and towards Irish and Scottish. These perceptions are important to consider when evaluating the alignment with a certain accent.

2.3 Dissociative Identity Disorder

The background provided about Dissociative Identity Disorder is sourced from “Understanding and Treating Dissociative Identity Disorder (or Multiple Personality Disorder)” by Jo Ringrose. This book is written for therapists and provides a very nice overview of the disorder.

Dissociative Identity Disorder (DID), also called Multiple Personality Disorder (MPD), is: “characterized by the presence of two or more distinct identities or personality states that recurrently take control of the individual’s behaviour, accompanied by an inability to recall important personal information that is too extensive to be explained by ordinary forgetfulness. It is a disorder characterized by identity fragmentation, rather than proliferation of separate personalities” (American Psychiatric Association, 2000, p. 519).” In other words, DID is a personality disorder in which a child develops personality splits as a result of trauma, usually sexual abuse. As a way to cope with abuse, a child’s mind, which has yet to form one cohesive personality, can unconsciously create barriers between different personalities and memories. Some people with DID are not even aware that they have been abused because a different personality holds the memory of that abuse. In a system with DID, there are host identities, who

hold executive control over the body most of the time, and alters, who often view themselves as separate people with their own bodies. There can be multiple hosts or several personalities that work together to present as the host. The host is typically an “Apparently Normal Personality” (ANP), which is a part of the system that is focused on pursuing a normal life. In contrast, alters can appear as “Emotional Parts” (EP), which often carry trauma. There is some disagreement about the definition of the terms ANP and EP. Some resources describe the host/s as an ANP and all alters as EPs, we believe this is a somewhat older understanding that no longer reflects the current knowledge surrounding DID.

There are many different kinds of alters that have been described, including child alters, which represent children that often do not age, fictional alters, which can be characters from books or movies, and even supernatural or non-human alters. Persecutor alters are identities that are EPs and can try to silence the other alters, often trying to stop other alters from sharing information about their trauma. Without therapy, these alters are potentially dangerous to the system because they do not realize that violence against the host or other alters will also hurt them. Another type of alter is the helper alter. These alters are typically ANPs and help the host be productive, cope, and maintain stability. These categories of alters are broad descriptions that aim to explain the role of the alter.

It is also common for one or more alters to be the opposite sex of the host. Other differences that are common are age, sexuality, race, and habits. Thus, the identities found within one system can differ dramatically. These identities often present with different mannerisms, style, facial expressions, posture, and speech.

Alters also make use of what is called the “Inner World.” This is where alters exist when they are not actively participating in the control of the body. A result of this internalized world is

the complication of an alter's personality. An alter may develop a more complex backstory of their life in the Inner World that directly fortifies and interacts with their sense of self.

3 Methods

This study is a case study of one individual with five personalities (one host and four alters). The data used in this study comes from a YouTube channel called "MultiplicityandMe." This channel is run by the system of five personalities and uploads many videos about DID and their particular system in order to spread awareness about DID and dispel the harmful stigmas surrounding the disorder. We chose to study this particular system because of the wealth of data/videos already existing, the number of identities in the system, and the recognizable traits demonstrated by each personality. This study can be broken down into two parts: phonetic variables of pitch, rate, and phonation and then accent markers.

3.1 The System

The system in this study consists of one host and four alters. There are at least two fragments that are not involved in the channel and are therefore left out of this description. It is important to note that this description is based off of many videos on the YouTube channel Multiplicity and Me and cannot be assumed to be a total representation of the system. Additionally, these are meant to be entertaining, therefore, we can assume there is an aspect of performance.

Another important factor of the system is the time frame from which our data come: this study is occurring well after Jess was diagnosed with DID and attended therapy. This has allowed the system to communicate more and work cooperatively to maintain a high level of functionality.

3.1.1 Jess

Jess is the host of the system and is also the only personality that identifies as female. She holds some of the trauma in the system and self-identifies as an EP and ANP. She is 28 years old in both videos used for this study.

She is the mother to a little girl and the wife to her husband Gaz. She lives in Wales and has a clear Welsh accent. Her personality is bubbly and feminine. At the time of videos within this study, she was a post-grad studying psycho-therapy in order to help others with conditions similar to her own. This shows that Jess is committed to educating people about DID.

Interestingly enough, Jess does not describe herself with the level of detail that the alters do. As Jess's personality was not created in order to fill a role in the system, in many ways it can be used as a comparison to the identity-based lives of the alters.



Figure 3. Representation of what Jess looks like⁵

3.1.2 Jamie

Jamie is one of the four alters within the system. He identifies as male and is aged 30 at the time of the first video and 28 at the time of the second. He does not hold any trauma for the system and identifies as an ANP. More specifically, Jamie is one of the protectors of the system.

⁵ Images are pulled from MultiplicityandMe's channel and are representations of how the alters see themselves.

His role in protecting the system involves helping to organize and control the system as a whole and aid with practical matters such as work and school.

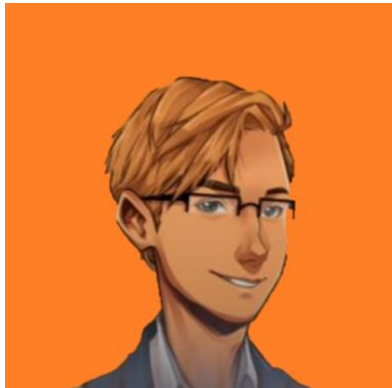


Figure 4. Representation of what Jamie looks like in the Inner World

His presentation when he fronts is unique in the sense that he is the only alter in the system who needs prescription glasses. He speaks RP, also known as the Queen's English because of its associations with the upper class.

In the Inner World, Jamie is a doctor who is married to one of the other alters, Ed. He and Ed have a son, Ollie, who is also an alter in the system. He is the brother of Jake, the final alter in the system. His backstory in the Inner World is notable for his posh upbringing, which is related to why he uses RP.

In terms of his personality, he is proudly bisexual and is also recognized for his intelligence.

3.1.3 Jake

Jake is a 27-year-old man at the time of the recording of the first video and 25 for the second video. He also plays an ANP role and serves as a protector of the system. His role as protector is partially rooted in his light-heartedness or child-like nature. That being said, he is also an EP who holds trauma memories. He was the first alter to appear in the system alongside Jess.

Jake's presentation is identifiable due to his American accent; specifically, he is a speaker of California English. His backstory equates this accent to him and his family traveling to the U.S. when he was younger. An alternate explanation for the presentation comes from an adaptation of voices heard on the Disney channel. This reflects his role in the system, which is related to escape and letting go.



Figure 5. Representation of what Jake looks like in the Inner World

Jake is the younger brother of Jamie, as previously mentioned, and in the Inner World, he is an actor. Jake is also creative in that he likes to sing and play the guitar. He also has a love for video games. In addition, he is responsible for editing and creative control of the videos posted.

3.1.4 Ed

Ed is a 32 year old man at the time of the both videos who self-identifies as gay. He serves primarily as an EP and, more specifically, as a persecutor and a sexual alter. A persecutor is an alter that carries a lot of hate and may take it out on the system. This is not only a result of trauma experienced, but also as a way to prevent future trauma. In addition, Ed is a sexual alter, which is an alter that is in control of the sexual aspects of life for the system. As a lot of trauma that results in DID is sexual in nature, this is also a form of protection. Ed's roles in the system seem to play a large part in how he presents himself.

On the outside, Ed has two main features that make him recognizable. The first is his strong Cockney accent and the second is his focus on his appearance. Ed likes to put makeup on, dress up, and style his hair.

In the Inner World, Ed is the stay-at-home husband to Jamie and the father of Ollie. He likes to help take care of Jess's baby, cook, and relax with a glass of wine. In terms of personality, Ed can come across as intense, probably due to his frank honesty.

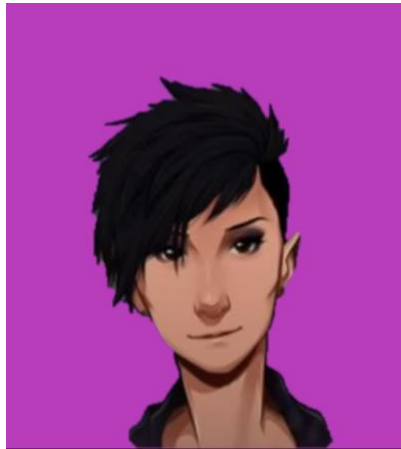


Figure 6. Representation of what Ed looks like in the Inner World

In terms of his own appearance, Ed visualizes himself to be quite tall (6'2''-6'4'') and thin. His eyes are brown, and his hair is dark black. His fashion has a goth look and feel to it.

3.1.5 Ollie

Ollie is the youngest alter in the system (that we are looking at), being ages 17 and 13 in the videos studied. He first appeared in the system at the age of 7 and is the son of Jamie and Ed. He is an ANP who does not hold trauma.

Ollie's youthful exuberance, demonstrated in his higher pitched voice and other cues, make him recognizable. He has an accent that can be best described as a mix of his parents' accents, RP and Cockney.

In his spare time Ollie likes playing video games and eating sweets. He helps make sure the system has fun. He is very opinionated and not shy about speaking his mind.



Figure 7. Representation of what Ollie looks like in the Inner World

3.2 Pitch, Speech Rate, and Phonation

The phonetic variables of pitch, speech rate, and phonation will be grouped together in the present study because they all use the same voice source. Differences will be analyzed with gender, sexuality, role in the system, and age as the focus. The variables of pitch and speech rate were selected for this study because they are two of the most salient differences between the speech of men and women. Phonation is the final variable we selected because of its wide range of recorded uses for identity presentation. The video used to analyze these variables is called “Meet the Alters 2” and was posted on November 30th, 2019 (MultiplicityandMe 2019). The video consists of an introduction, each alter responding to ten specific questions, and a conclusion. For the purposes of our study, we focused solely on the responses to the ten questions. This video was chosen for several reasons. First, this video has all of the five personalities responding to the same set of questions. This serves as a way to control for the content of their speech, which could influence the variables we are studying. Second, it has all the alters in one video, meaning the data was collected around the same time and in a similar context. Finally, the questions asked in this video center around the identities of the alters. While

not as specific as the data used for the accent analysis, it is the hope of the researchers that this discussion of identity will result in the clear presentation of speech traits that index the personality of each alter.

After the video was downloaded from YouTube, the background music was professionally removed by an audio technician and phrases to be used in the analysis were selected. In order to ensure that the sentences analyzed for pitch, rate, and phonation were chosen without bias from the researcher, a randomization process was used. First, we identified the syllable length for all the intonational phrases that specifically answered one of the ten questions posed to Jess and the alters ($mean = 8.65, sd = 4.22$).⁶ After rounding these numbers we were left with an average syllable length of 9 ± 4 . Therefore, the range of syllables used to select intonational phrases was determined to be 5-13. One sentence selected was only four syllables as it was the only sentence from that alter for that question (Ollie question 4). To randomize the samples, a random number generator (<http://www.randomnumbergenerator.com/>) selected one phrase per question for each alter that fell within the given range. While all types of sentences were used to calculate the average number of syllables, only declaratives were assigned numbers that could be chosen by the number generator. The original syllable counts were a rough estimate, and after checking with the true pronunciation of the speakers some of the counts changed a small amount. Only two then fell outside the given range, both with 15 syllables. Furthermore, one of the questions was removed from the study because of the emotional nature of the responses. Ultimately, nine sentences from each alter were segmented in Praat (Boersma and Weenink 2019) and used to analyze pitch, speech rate, and phonation, as detailed below:

⁶ The boundaries for Intonational Phrase were coded by ear with specific attention to pause length and final lengthening.

1. Pitch

For each sentence segmented in an interval tier, mean, minimum, and maximum F0 values were extracted using a Praat script (Boersma 2004). The sentences used for these phonetic variables were also standardized for emotion, as to not color the results.

2. Speech Rate

Using Praat, we calculated the total length of acoustic energy for the sentence. Each syllable was coded by hand with the sound and waveform guiding the length of each sentence. All pauses greater than 75 ms were coded and not included in the syllable count. The rate was measured by dividing the total length of the sentence (in seconds) by the number of syllables.

3. Phonation

Phonation data was extracted using a script (Christian DiCanio 2007/2008/2012), which selected three arbitrary points for each Intonational Phrase (IP) and measured the H1-H2 (among other values related to spectral tilt).

3.3 Accent Markers

The coding of accent markers is separated from the general phonetic variables discussed in the previous section due to a difference in audio used. Instead of choosing specific sentences, accent markers were coded within ~2 minutes of continuous speech. Different videos were used as sources of data for each alter. To standardize the data sources, specific criteria were used in the selection of videos from which the ~2 minutes of speech were pulled. First, the video had to highlight the individual identity of the alter in order to control for content and in the hopes that this would cause increased performance of identity. Second, the speech had to be directed at the camera without additional individuals in the room. Third, the speech had to be unprompted,

meaning that repetitions of questions were not counted nor were vocalizations of written materials. Finally, any highly emotional content was avoided for consistency.

For Ollie, Ed, and Jamie, the videos used were part of a series of “A Day in the Life of...” These were selected because their personalities are highlighted as they demonstrate who they are to their audience. Any speech not directed at the camera was not considered for analysis. For Jess, a video entitled “Mental Health and Me: Pregnancy and DID” was used. This was once again selected because it demonstrates her identity, especially as a mother. A later portion of the video was selected for analysis because the first half of the video dealt with highly emotional topics. Finally, the video used for Jake, “Ask an Alter Questions”, features Jake describing the direction of the channel. This video accentuates Jake’s personality because it relates to his passions: making videos for the channel and expressing himself. With the exception of Jess, all coded material began as soon as speech that fit the described criteria began, in order to somewhat control for bias on the part of the researchers. It is important to note that these videos were recorded across a wide range of time, and thus the ages of each alter are significantly different. We decided this difference was acceptable because accents are likely more stable than other phonetic variables across time.

The accents that the various personalities in the system use were quantified by selecting one or two distinctive phonetic features of the accents and coding each instance within the selected audio of all the alters. Additionally, the word-choice that is regionally specific, profanities, and phonetic realizations that each personality used during the audio were noted in order to see if any patterns emerged.

The accent markers used are as follows (also summarized in Table 2): the lack of /h/-dropping for RP (Jamie), $\theta, \delta \rightarrow f/v$ (th-/dh-fronting) for Cockney (Ed), the use of ‘me’ for ‘my’

for Cockney (Ed), and the formants (F1 and F2) of the vowels found in BOOT, PUT, BOAT (for an American) for a Californian accent (Jake). As Ollie shares characteristics of both RP and Cockney, no specific accent marker was considered for him. Additionally, Jess's accent served as a control to study the accents of the alters, as her accent (Welsh), is representative of where the body is from. Therefore, if identity were not a factor in producing accents, we would expect all of the alters to have a Welsh accent.

	/h/-dropping	th-/dh-fronting	my→ me	California Vowel Shift
Jamie				
Jake				X
Ed	X	X	X	
Ollie	X	X	X	
Jess (control)	X			

Table 2. Accent markers with the alters expected to demonstrate them marked with 'X.'

Initially, a portion of audio around 2-3 minutes was transcribed for each alter. Then, an IPA converter was used on the data (<https://tophoneics.com/>). This was done in order to ensure that the coder did not miss any of the tokens within that set of audio and the IPA was checked over by the coder as well. The accent markers for RP and Cockney were marked per instance they could occur for each of the alters. For example, every /θ/ was coded for if it surfaced as a [f] or [θ] for all the alters. To test for a Californian accent, we relied on the well-recognized California vowel shift characteristics. Following the methods set forth in Podesva (2011), American BOOT, PUT, BOAT vowels were segmented and coded by hand based on visual and audio cues in Praat and the formants in the center of the vowel were extracted using a script (Lennes 2003). All the examples of these vowels within the selected audio clip were used to compile a vowel chart for each alter. Cues for /h/-dropping and th-/dh-fronting included

visualizations of noise on the spectrogram. For vowels, formats marked by Pratt served as cues for the beginning and end of a given vowel.

4 Results

All statistical models presented in this section were constructed in R (R Core Team, 2020) and visualizations were created using either the ggplot2 package (Wickham, 2016) or in Excel.

4.1 Phonetic Variables

4.1.1 Pitch

The average pitch of each of the nine sentences shows several interesting trends, illustrated in Figure 8.

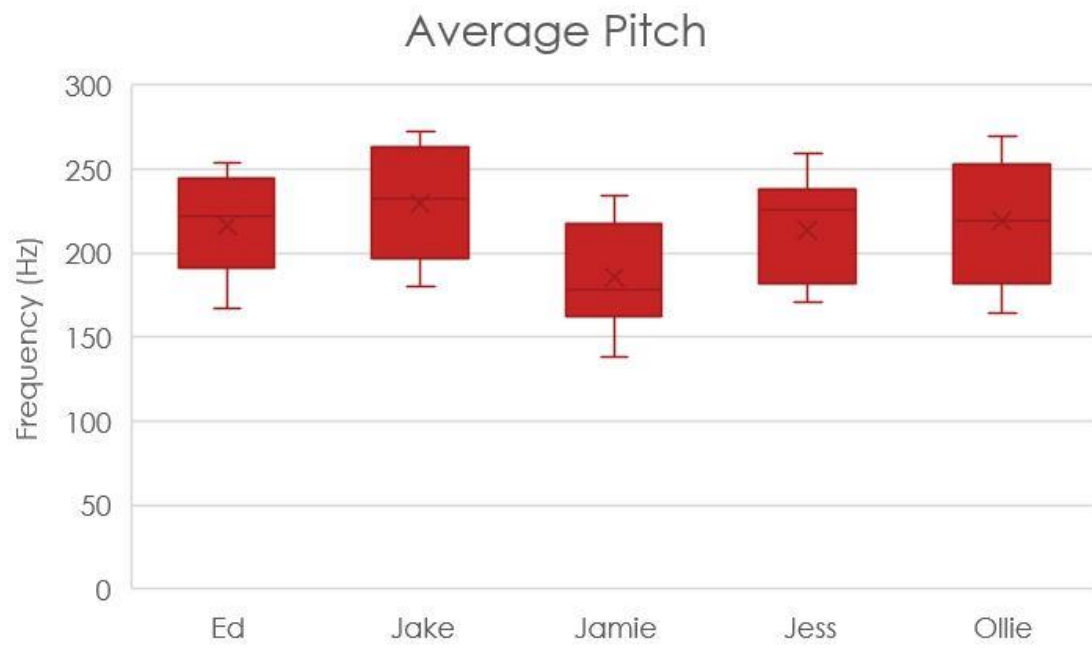


Figure 8. Average pitches over the nine sentences by speaker with the 'X's' indicating the mean.

First, we observe that Ollie and Jake trend together with respect to average pitch, as do Jess and Ed. Jamie has the most distinct pitch, with the average lower than all the other alters. A linear regression showed that Jamie's mean pitch was significantly lower than Jake's (Coeff:-43.7, $t=-2.78$, $p<0.01$); no other differences were statistically significant. This is to say that,

when considering Jake's values, all of the alters except for Jamie are in a predictable range. The differences here, while minimal, support our hypothesis that identity may motivate phonetic variation in speech.

The range in pitch across the nine sentences was also examined, but no significant findings arose.

4.1.2 Speech Rate

The average speech rate over the nine sentences shows a much different pattern than pitch. Like pitch, Jake and Ollie have similar speech rates, but Jess and Ed have very different rates of speech, as illustrated in Figure 9. Jess has the highest speech rate, meaning that she has the highest number of syllables per second while Ed has the lowest. The average speech rates for all the alters fall between four and six syllables per second.

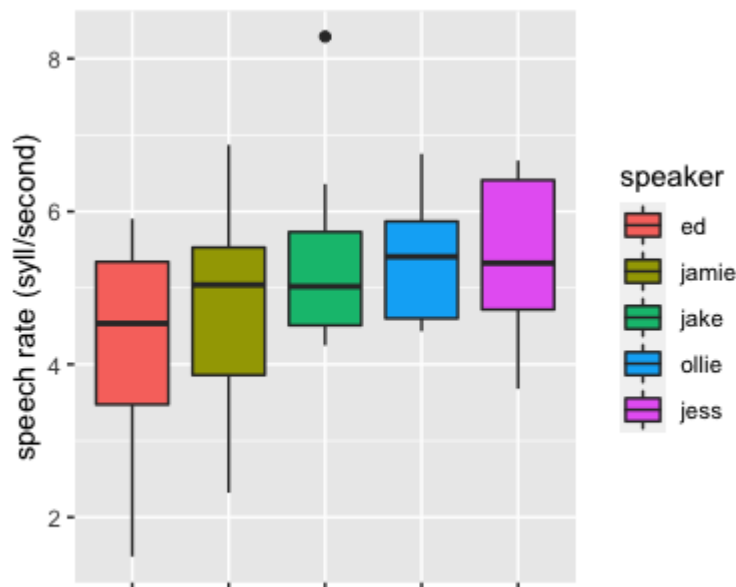


Figure 9. Average speech rate by speaker.

A linear regression showed that the difference between Jess and Ed is statistically significant; that is, Ed's speech rate is significantly slower than Jess's (Coeff=-1.25, $t=-2.12$,

$p < 0.05$). Once again, the fact that there is a difference between the speech patterns of the alters supports our hypothesis that speech is a means of expressing identity.

4.1.3 Phonation

The results regarding phonation similarly demonstrate differences between the alters, as illustrated in Figure 10. The categories for breathy, modal and creaky were determined by H1-H2 with values less than or equal than negative five dB considered creaky, values negative four to four dB as modal, and values greater than or equal to five dB considered breathy. Ed uses the most creaky voice of all the alters. A binary logistic regression model predicting use of creaky voice vs. all other phonation types determined that these findings are not significant, although the difference between Ed and Ollie is trending towards significance (Coeff: -1.64, $t = -1.90$, $p = 0.57$). This indicates that it would be unlikely for the phonation patterns seen by Ollie to be replicated by Ed.

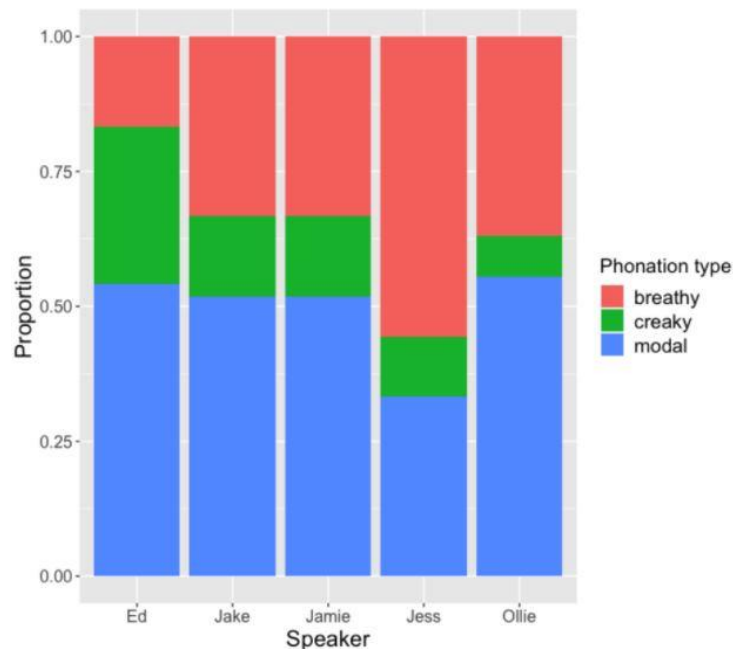


Figure 10. Proportion of phonation type by speaker

On the other end of the spectrum, Jess uses the most breathy voice, and a binary regression model predicting use of creaky voice vs. all other phonation types reveals that Ed uses significantly less (Coeff: -1.83, $t=-2.73$, $p<0.01$). Jake and Jamie show remarkably similar patterns of phonation while Ollie uses slightly more modal voice than them.

4.2 Accent Markers

4.2.1 RP

The accent marker used to demonstrate RP in this study is /h/-dropping, which is not used in RP but is salient in middle- and working-class dialects of British English. Figure 11 shows the percentage of /h/-dropping by each speaker.

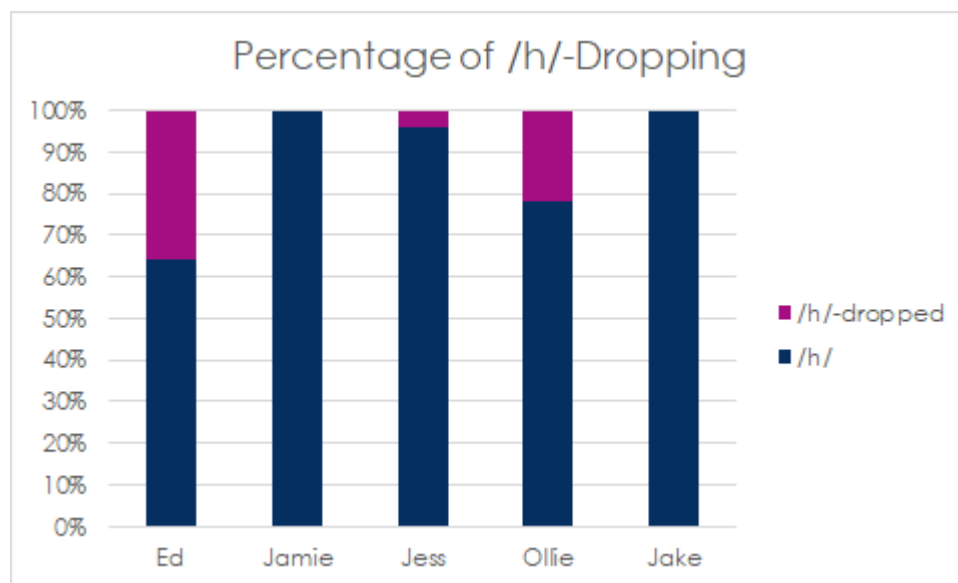


Figure 11. Percentage of /h/-dropping by speaker

We found that Jake never drops the /h/, which aligns with a Californian accent. Ed, Ollie, and Jess all have occurrences of /h/-dropping, with the highest percentage coming from Ed. A binary logistic regression shows that Jess drops /h/ significantly less than Ed (Coeff: -2.55, $t=-2.19$, $p<0.05$), but not Ollie. Jamie never drops /h/, which is expected given his RP accent.

4.2.2 Cockney

The percentages of th-fronting and dh-fronting show radically different patterns. Th-fronting seems to be categorical for Ed, as he uses it 100% of the time. Jake, Jess, and Jamie never used th-fronting, although Jamie does show one case of deletion, as illustrated in Figure 12. Ollie is the only alter who shows variety in this feature, with one case of th-fronting. The pattern of dh-fronting in the system is limited to Ed, who shows a mixture of fronting and deletion, as illustrated in Figure 13. Unsurprisingly, Ed uses th- and dh-fronting significantly more than all the other alters who use this feature (for Ollie, Coeff: -5.42, $t=-3.71$, $p<0.001$; for Jamie, Coeff: -6.17, $t=-4.26$, $p<0.001$).

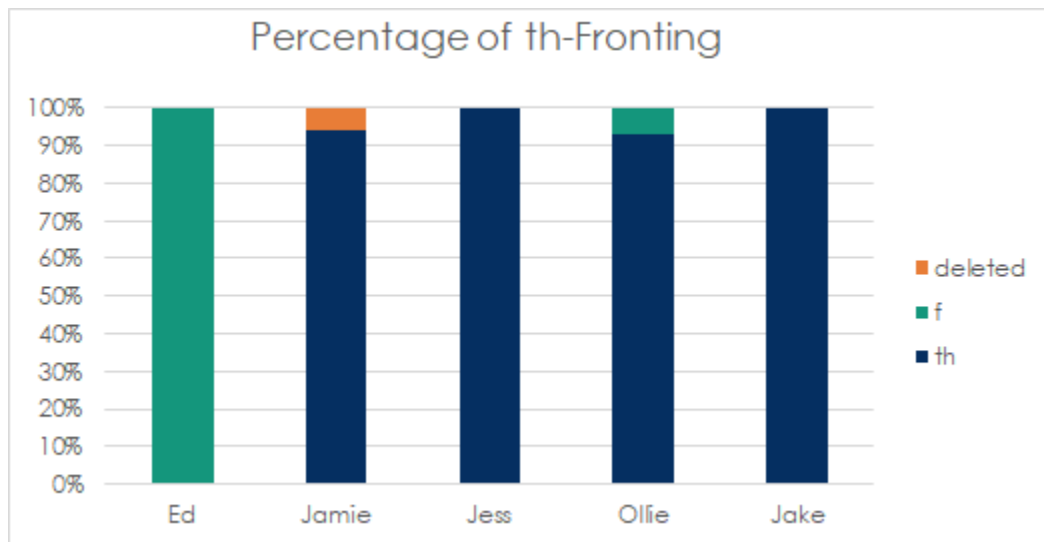


Figure 12. Percentage of th-fronting by speaker.

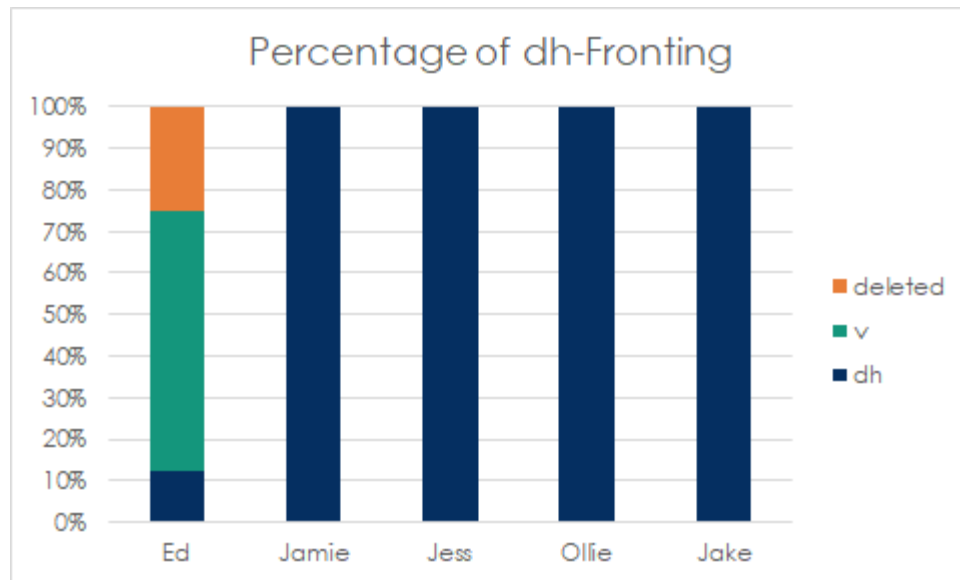


Figure 13. Percentage of dh-fronting by speaker.

The fact that Ed demonstrates the Cockney accent marker significantly more than the other alters indicates that the use of the Cockney accent is individual to Ed, with the minor exception of Ollie. Additionally, these data show that Ed consistently produces this feature of his accent.

Another feature of Cockney is the use of ‘me’ instead of ‘my.’ For example, a Cockney speaker may say “I need to put on **me** makeup.” The percentage of ‘me’ usage is demonstrated in Figure 14.

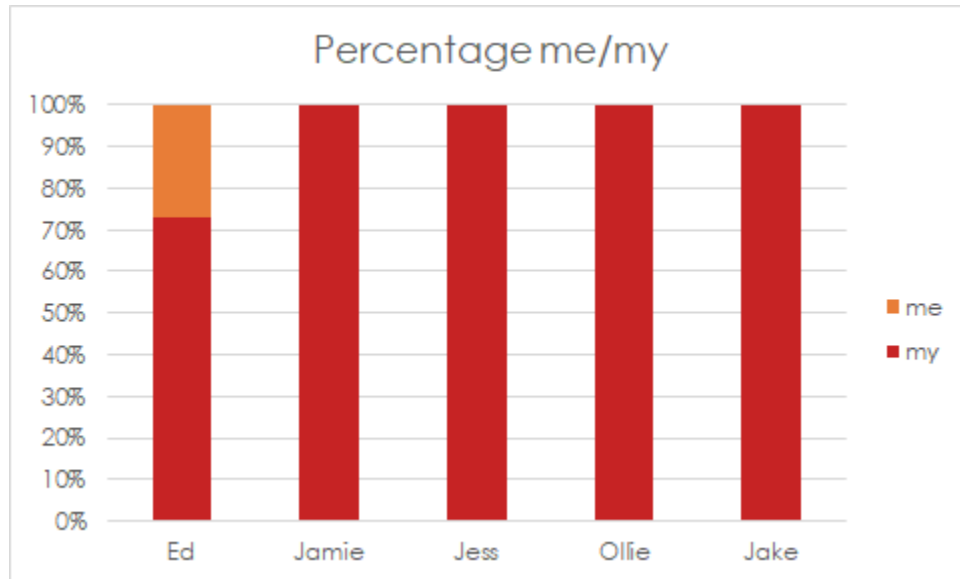


Figure 14. Percentage of ‘me’ versus ‘my’ usage by speaker.

The results of ‘me/my’ usage show that only Ed uses this accent feature, and only a portion of the time.

4.2.3 California Accent

The alters clearly have notable differences in the vowel space they use for the BOOT, PUT, and BOAT vowels, as illustrated in Figure 15). Interestingly, Jake’s vowels are not further forward than the other alters. Jess’s BOOT vowel shows the most fronting in the system.

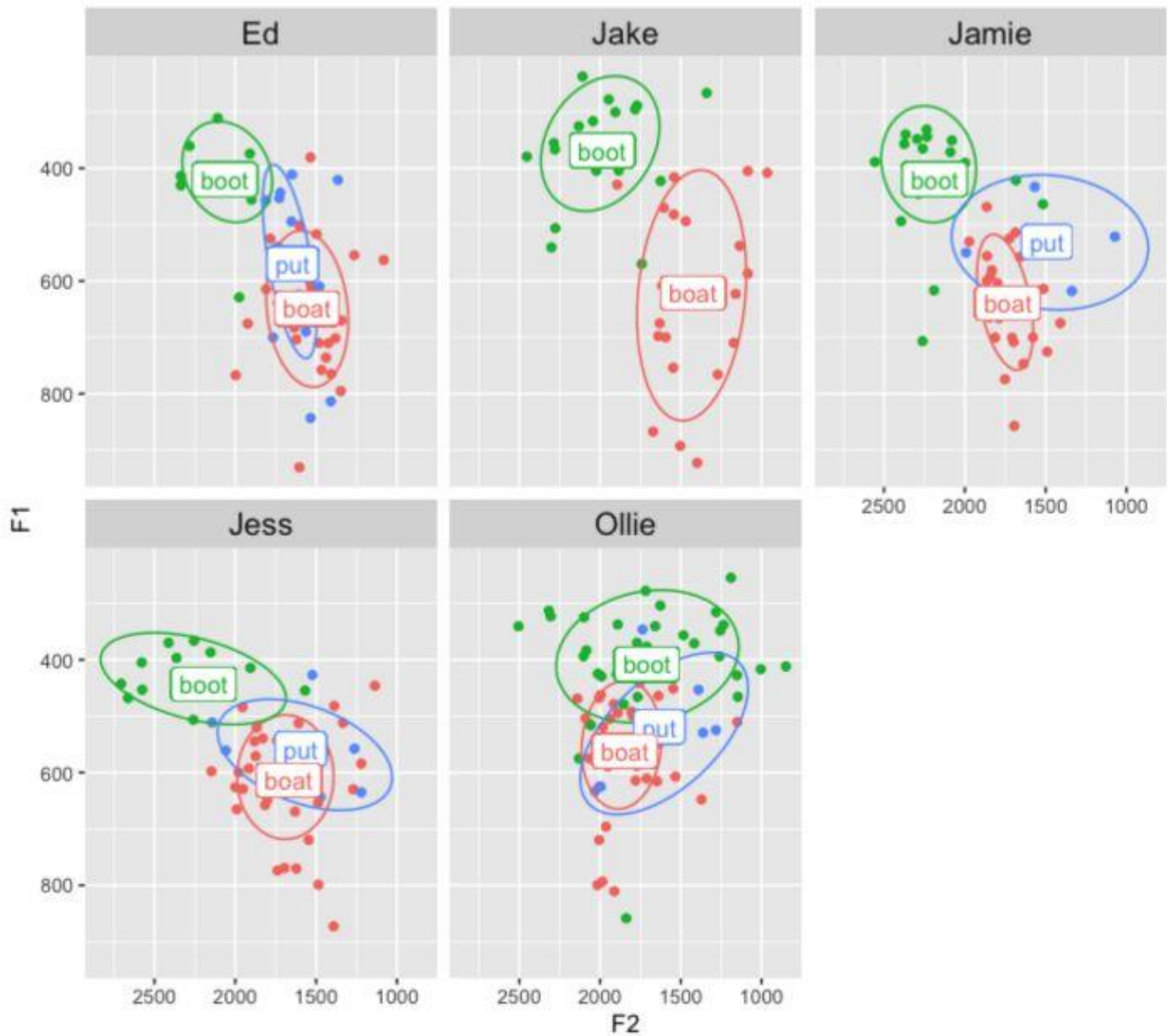


Figure 15. F1 and F2 of BOOT, PUT, and BOAT vowels by speaker.

There are no significant differences between the alters' PUT vowels. However, when compared to Ed, Ollie's tokens are significantly higher and fronter for the BOAT vowel (F1: Coeff:-86.5, $t=-3.3$ $p<0.01$; F2: Coeff: 289, $t=5.7$ $p<0.01$). For the F2 of BOAT, also with reference to Ed, Jess and Jamie's tokens are significantly more towards the front of the vowel space as well (Jess: Coeff: 113.2, $t=2.23$ $p<0.05$; Jamie: Coeff: 176.4, $t=3.1$, $p<0.01$).

Conversely, when compared with Ed, Jake’s BOAT vowel is significantly more back (Coeff: -133, $t=-2.2$, $p<0.05$). The only significant difference in the BOOT vowel when compared to Ed is that Ollie’s tokens are significantly further back (Coeff: -356.6, $t=-2.9$, $p<0.01$).

4.2.4 Other Interesting Findings

In the process of combing through the source materials, other interesting data points arose. These observations are summarized in Table 3..

Speaker	Findings
Ed	Cursing, swearing, used of ‘lush’ and ‘proper’
Ollie	Long [ɑ:], use of ‘shag’
Jake	Use of ‘totally’
Jamie	French pronunciation

Table 3. Interesting findings in the data outside the variables studied.

First of all, Ed was the only alter who cursed in either video. In addition, he was the only alter to make use of double negation. Another notable aspect of Ed’s speech is his use of the word “proper” as an adverb, such as “proper cuddler.” He uses this term in conjunction with another unique lexical item in the phrase “proper lush.” Ollie also uses a unique lexical choice with the word “shag” as a verb to mean “yell at.” Additionally, Ollie produces a long [ɑ:], a salient feature of RP, in two cases. Jake is the only alter who uses “totally” in the data set, and does so a number of times. Finally, Jamie uses a French pronunciation of the word “me”: *moi*.

5 Analysis and Discussion

Overall, the data presented here support the hypothesis that the alters in this system are using language as a means of constructing and representing their unique identities. As the alters share the same vocal tract and physical body, physiological differences are an unsatisfying explanation for the observed variation; rather, we propose that systematic differences in their

speech production indicate a level of identity performance. This section explores the relationship between linguistic variation and identity within the Multiplicity and Me system.

5.1 Phonetic Variables

The results from the phonetic variables are both interesting in their own ways and provide valuable insights when compared to one another. Table 4 consolidates the various results in order to present a more cohesive picture of our findings.

	Pitch	Speech Rate	Phonation
Jake	-Highest -Trends with Ollie	-Mid -Trends with Ollie	-More breathy than creaky -Trends with Jamie
Jamie	-Lowest	-Large range	-More breathy than creaky -Trends with Jake
Ed	-Mid -Trends with Jess	-Lowest	-Creaky, much less breathy
Ollie	-High -Trends with Ollie	-Mid -Trends with Jake	-Small amount of creak
Jess	-Mid -Trends with Ed	-Highest	-Breathy, much less creaky

Table 4. Phonetic results compared across the alters.

5.1.1 Pitch

The fact that there are significant differences in pitch within the system at all strongly supports the hypothesis that language is being used to perform identity. As all the alters share the same anatomy, there is no reason that their pitch would be different. Since this is clearly not the case, it is safe to reject the null hypothesis.

The social characteristics surrounding the use of pitch are very salient, even to untrained listeners (Podesva and Callier 2015). Perhaps, for this reason, the pattern of pitch within the system aligns clearly with expectations. First of all, Jamie has the lowest pitch of any alter in the

system. Lower pitches are more common among men due to vocal tract size, and are therefore often associated with masculinity. Jamie is the second oldest in the system and presents with a strong male identity. His use of a relatively low fundamental frequency is just one of the strategies Jamie uses to project his masculinity. In addition, Jamie's role in the system is related to control and presentability, which society often correlates to masculinity. The use of a lower pitch by Jamie could allow for a presentation of his age, gender, and role in the system. As Jamie exists inside a body that differs with aspects of his identity, like age and gender, language becomes an important tool in expressing identity.

As Jess is the only woman in the system, we can use her average pitch as a control for what a feminine pitch is considered for this body. As Jess identifies as very feminine, it makes sense that her pitch would be higher to show this. Interestingly, Ed's average pitch is similar to Jess's. This similarity could be the result of a few different things. First of all, Ed is a gay man and is considered flamboyant by the system. Indeed, in a comprehensive review of the literature on the role of f_0 in "performing gayness," Podesva (2007, p. 481) notes that "[s]peaking with high f_0 levels is not simply a way to sound gay, but a way to sound flamboyant". Thus, Ed's higher pitch could be a representation of his sexuality. Furthermore, Ed is also a sexual alter. One of his roles in the system is to control male attention. From this perspective, Ed could be using a higher pitch to present as more feminine. It might be the case that both of these aspects of identity are at play for this variable.

The most interesting result from pitch is the pairing of Jake and Ollie, which also appears for other variables. Jake and Ollie both show a higher pitch than Jess, the feminine control. While originally unexpected, as they are both men, this pattern ultimately makes sense. While Jake and Ollie are both male and want to present as male, they are instead using pitch to

represent their roles in the system. Jake and Ollie have a shared role in the system surrounding youthfulness and fun. While studies have examined the use of pitch in projecting masculine and feminine identities, very little has been done to study the role of pitch in youth presentation, as differences are simply attributed to vocal tract size. However, since children have the smallest vocal tracts, and therefore the highest pitches, it's logical that a youthful persona could be linguistically expressed via higher pitch. The pairing of Jake and Ollie seems to indicate that the expression of a youthful identity may be what's driving this variation.

5.1.2 Speech Rate

While Jess and Ed trend together on pitch, they are on opposite sides of the spectrum for speech rate: Jess has the highest speech rate and Ed has the lowest. These results directly contradict our hypothesis for speech rate. Based on previous literature (Borsel and De Maesschalck 2009), we anticipated that Jess would have the lowest speech rate (females have typically been found to employ slower speech rates than males. As this is not the case, we believe that other factors of identity, besides gender, are being performed with regards to speech rate.

Kendall (2013) provides a detailed overview of sociolinguistic factors that appear to impact speech rate. In his review, he notes that speech rate is highly salient for listeners and is therefore utilized by listeners as a means for social evaluation. Perception studies have shown that faster speech rate is associated with competence, intelligence, and expertise, while slower speech rates are associated with honesty and truthfulness. While these perceptions are dependent on the specific society, we can contextualize our results with these perceptions in mind. For example, Jess could be using a faster speech rate in order to demonstrate her high intelligence and expertise in her area of study (psychology) along with her use of the channel to educate. As a

woman, she might be in a position where demonstrating competence is more important than truthfulness. Jamie, on the other hand, also values his intelligence but shows a much larger range with respect to speech rate. This could indicate that Jamie uses speech rate in different ways to portray different qualities. For some answers, he could be using a faster speech rate to show intelligence, while for other questions, he might speak slower to show he is being honest.

One of the questions in the phonetic variable dataset sheds light on the alters' feelings towards lying. The question asks, "who do you think lies the most?" Jess, Jake, and Ollie reveal that they are more okay with lying, especially if telling the truth would hurt the other person. Jamie and Ed have a different relationship with lying. Ed, specifically, highly values the truth and does not like to lie. These opinions can be charted onto the results of speech rate relatively accurately. Ollie and Jake, who are not trying to demonstrate their honesty or intelligence, fall somewhere in the middle in terms of speech rate. As Jess is trying to demonstrate intelligence and not honesty, her values skew higher. Ed's main priority with speech rate is to show his trustworthiness and honesty, explaining his lower values, while Jamie is displaying both his honesty and intelligence with speech rates all across the board.

5.1.3 Phonation

The phonation data is interesting to analyze because we embarked on this study with no fully developed hypotheses in this respect. Phonation is a prevalent sociolinguistic variable and its role in constructing identity is highly specific to the cultural context in which it is used; thus, it is difficult to predict what the data might show. Figure 10, repeated here as Figure 16, reveals that Ed and Jess show contrasting results once again.

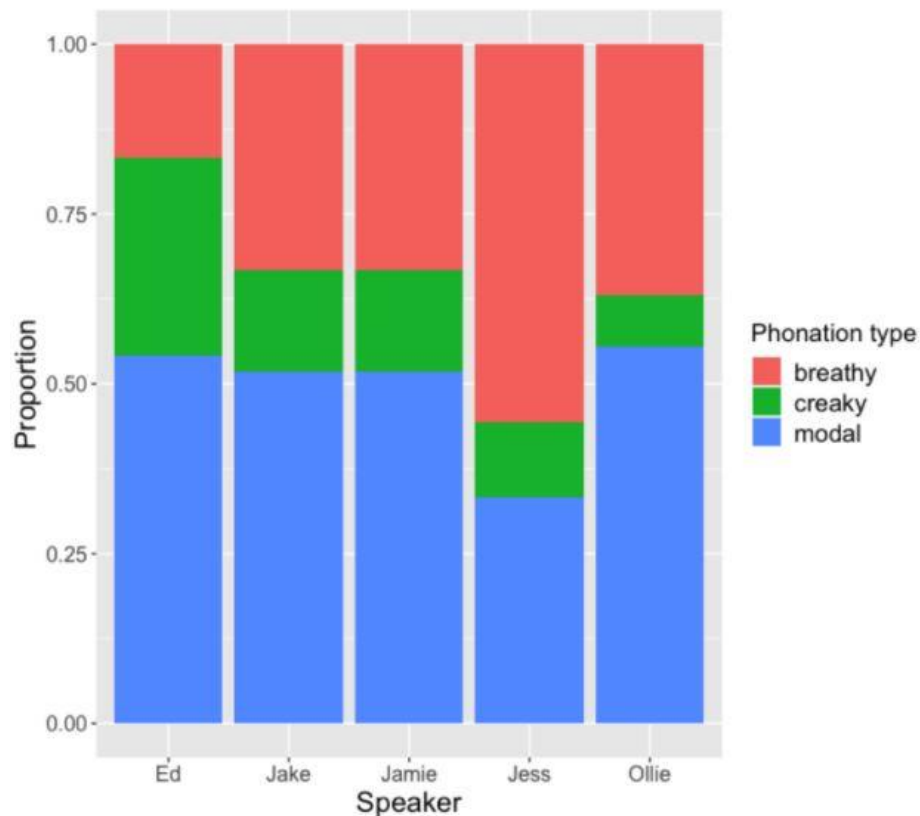


Figure 16. Proportion of phonation type used by each alter.

While Ed uses the most creaky voice and the least breathy voice of any alter, Jess is the opposite, employing high rates of breathy voice and very little creaky. There are several possible reasons for this difference in related literature. One of the most popularly cited explanations for the use of creaky voice is to portray a masculine identity, due to a sociobiological interpretation. However, more recent data has theorized that creaky voice is not being used to index masculinity, but rather authoritativeness (Greer and Winters 2015). While this authoritative narrative does align with Ed’s personality, perhaps a more accurate explanation comes from Mendoza-Denton (2011). Mendoza-Denton describes how the use of creaky voice is used to index a hardcore Chincanx gang persona “for both self-protection and self-preservation (p. 262)”. As one of Ed’s roles in the system is to protect the system in his persecutor role, it is

possible that creaky voice is used to project a hardcore image. Jess, on the other hand, is not responsible for that role in the system, and therefore would not want to project that identity.

While Jess chooses not to employ creaky voice as often, she does use breathy voice with some frequency. Previous research has found that breathy voice conveys anxiety (Zetterholm 1998). It is possible that Jess was more anxious than usual due to being filmed, or something of that nature. That said, the use of breathy voice has also been attributed to several other characteristics, including sexiness, which harkens back to phone-sex operators (Podesva and Callier 2015) and a femme fatale or dumb blonde archetype often seen in films (Jeong 2017). Because of her trauma, Jess is not comfortable with projecting sexuality to the public, making these explanations unsuitable. We propose that the higher use of breathy voice is due to her identity as a mother. Studies have found that vowels in infant-directed speech are breathier (Miyazawa et al. 2017). While this is not a confirmed finding on a sociolinguistic level, it does align with the expectations of what Jess is trying to convey with her speech.

5.2 Accent Markers

The impetus to test for accent markers was two-fold. First, we were interested in whether the alters used salient accent markers of their respective dialects as a way to affirm their unique identities. Second, we were curious as to whether accents that alters have bled over to other alters or if they remained siloed. However, the data collected demonstrate additional interesting trends that will also be discussed in this section.

5.2.1 RP

RP is generally viewed as prestigious and is associated with intelligence and social status. The data showing that Jamie categorically does not /h/-drop while the other alters do shows an alignment with the RP accent and identity. As the reader will recall, Jamie demonstrated a wide

range of speech rates. We believe that while it is important to Jamie to index intelligence (as a low speech rate does), he can be less reliant on this phonetic resource because RP also conveys this trait.

Jake shares the lack of /h/-dropping with Jamie, but not because he shares the RP accent. The California accent that Jake has does not use /h/-dropping, similar to RP. Therefore, the fact that Jamie and Jake trend together for this variable is a coincidence. Additionally, this means that the lack of /h/-dropping in RP and California English does not impact the speech of the other alters as Jake and Jamie are the only ones with this feature.

5.2.2 Cockney

The Cockney accent is a working-class accent that has long been associated with lower social status and lower attractiveness (Coupland and Bishop 2007). That being said, Ed strongly aligns himself with these characteristics by using Cockney features with a high frequency. For example, Ed always th-fronts, and almost always dh-fronts. Not only are these highly noticeable features, but Ed uses them with a frequency perhaps higher than other Cockney speakers. In addition, he uses the unique feature of saying “me” for “my.” Again, this accent marker is highly salient for listeners. We believe that Ed is using a Cockney accent to index a hardcore persona in line with his role as a protector of himself and the system. Indeed, sociolinguistic research has long posited that working-class vernaculars carry covert prestige and “are related in particular to notions of masculinity, toughness, and group solidarity, and as such, affect male speakers more than female” (Snell 2018, p. 667).

Ollie also uses the Cockney feature of th-fronting once in the data set. As Ed is Ollie's father, and because Ollie uses this feature more infrequently, we argue that this is not the bleeding of accents, but rather a learned familial feature.

5.2.3 California Accent

The data testing for the California vowel shift reveals some interesting patterns. First of all, it is clear that Jake does have a California accent. Given the well-established social meanings associated with California English, Jake's use of this accent evokes the qualities of being laid-back, cool, and fun. These characteristics are most likely related to one of Jake's roles in the system: serving as a release. The system notes that Jake probably picked up a Californian accent through watching Disney when he was a child (about 20 years ago). This is another indication that the California accent is intended to emphasize his role as a happy, fun-loving part of the system.

However, the result of having acquired this accent in childhood and not actively participating in a speech community that employs this same dialect, Jake's accent has remained stagnant over time. The California vowel shift that we were testing for is a relatively recent sociolinguistic change. The fact that Jake does not show evidence of this shift demonstrates that his California accent is an antiquated representation. This could also explain why Jake does not show higher rates of creaky voice, which has become a defining feature of California English in recent years. That said, Jake still embodies the qualities enregistered by the California dialect, even if his accent is not changing in line with the current trends.

The other interesting thing we observe upon examining the vowel production of the different alters is how distinct their vowel spaces are. This shows that their accents are

systematically different phonetic characteristics. These results demonstrate that the construction and presentation of identity is a fundamental driver of linguistic variation.

5.2.4 Other Interesting Findings

The other findings of this study further support the interpretations above. First of all, Jamie uses a French pronunciation, which is a feature of RP. This shows that he uses multiple features of RP, not just the one we focused on. Ed also demonstrates other features of Cockney in his slang. The use of cursing supports the analysis that Ed is trying to present a rough and abrasive identity. Jake commonly uses the word ‘totally,’ which helps him perform his California accent. Finally, Ollie shows features of both RP and Cockney. This indicates that Ollie’s acquisition of his accent was much as it would be for any child. He uses features from his surroundings to form the identity he wants to present.

6 Conclusion

This study was conducted in order to see how the presentation of identity is performed when all biological factors remain the same. We hypothesized that the phonetic features of the alters would differ according to their unique identities and how they want to present themselves. The data presented here support our hypothesis as there were significant differences between the alters that cannot be explained by their anatomy. We found that alters prioritized the presentation of their roles within the system over aspects such as gender and sexuality. Jake and Ollie use a higher pitch, possibly to demonstrate their roles as youthful outlets in the system. Jamie uses RP and speech rate to demonstrate his intelligence, presentability, and his role in the system, while he uses pitch to reflect his gender. Ed primarily presents a hardcore persona that aligns with his role in the system through phonation and accent markers. However, he also highlights other characteristics that are fundamental to his identity like his sexuality and truthfulness, which are

indexed via pitch and speech rate, respectively. Finally, Jess uses pitch to portray her femininity, speech rate to show her intelligence, and phonation to index her role as a mother and caretaker.

Further research in this area has immense potential to answer questions about identity performance that have been muddled or explained away with anatomy. In this study, we were also able to find evidence for youth performance, a phenomenon that has not been well-documented in the literature and necessitates further study. Future research has the ability to expand into perception studies, bilingualism in systems, and psycholinguistics, as each system is different and will have its own unique presentations of identity.

If you want to support the DID community, you can visit First Person Plural:
<https://www.firstpersonplural.org.uk/help-fpp/>

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