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Social Perceptions of Word-Final Alveolar Stop Deletion: Examining the Meaning of a Sociophonetic Variable

Emily C. Dick
Purdue University

SOCIAL PERCEPTIONS OF WORD-FINAL ALVEOLAR STOP DELETION: EXAMINING THE MEANING OF A SOCIOPHONETIC VARIABLE

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STATEMENT OF THESIS APPROVAL

Dr. Mary Niepokuj, Chair

School of Interdisciplinary Studies

Dr. Felicia Roberts

Brian Lamb School of Communication

Dr. Olga Dmitrieva

School of Languages and Cultures

Approved by:

Dr. Alejandro Cuza-Blanco

Head of the Linguistics Graduate Program

For my parents, Jim and Donna, without whom I wouldn't have had the courage to 'go for it.' They have been an unwavering source of love, support, and encouragement.

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ABSTRACT

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Word-final alveolar stop deletion is a form of variation that is found in many dialects of American English, and therefore, has been extensively studied and documented in the literature. Within the available literature, however, there is very little information to be found regarding if and how listeners use this variation to form initial judgments about a speaker's character. The work described in this thesis is an attempt to begin bridging this literary gap. This thesis studies how both word-final alveolar stop deletion and speaker gender, as well as the interactions between these two factors, affect a listener's initial opinions about a speaker.

To achieve the goals of this thesis, a matched guise experiment was designed and run, the results from which are promising. Word-final alveolar stop deletion shows significant results for several characteristics, especially those most closely aligned with a person's *competency*. Gender shows significant results for a number of traits as well, particularly those associated with a person's *likability*. There are also several characteristics that have significant results for an interaction between these two factors. This thesis indicates that word-final alveolar stop deletion, though overlooked in perceptual work thus far, is a sociolinguistic variable that does carry social meaning for its listeners. Though these results are just an initial step towards understanding the social meaning of this variable, they promise an interesting path for future research.

1. RESEARCH OVERVIEW

Imagine that you receive a phone call from an unknown number. You answer the call and have a brief conversation with the person at the other end of the line. You don't know this person; you've never met before. When you hang up the phone, you have undoubtedly formed an opinion or made some snap decisions about this unknown person based solely upon your brief conversation (Chambers 1995:2). You might identify which part of the country you believe this person to be from or perhaps you may make a conjecture about the gender, ethnicity, nationality, or age of the person with whom you spoke. You might even describe them in terms of how friendly, educated, laid-back, wealthy, or dependable they sounded. But what is it about a brief interaction with a stranger that allows us to develop these judgments? Most likely the unknown caller did not directly share this information with you, so what then is the source of this information? Why do you feel as if you know more about the speaker than just the words they spoke to you?

Human language allows its users to communicate complex messages with one another. Simply stated, users of a language construct these messages by building individual sounds into words, words into phrases, and phrases into larger sentences. Listeners then unpack the intended message from the meanings of the words and sentences they hear. But word and sentence meanings are not the only source of information for listeners. It is widely accepted that language allows users to communicate a great deal more than just the words spoken. Ladefoged (1957:98) explains:

> In addition to the information we receive as a result of considering an utterance in terms of a linguistic system, we also receive information of a different kind about the general background of the speaker; thus we can

> usually infer something about a speaker's place of origin and his social status from his accent.

Language allows its users a great deal of creativity and variation. By manipulating things such as intonation, word choice, syntactic structure, or phonetic variables users are capable of sending and receiving information about such topics as speaker opinion, group membership, or in which geographical region a speaker grew up. Often this is achieved with little consciousness of the mechanism that has allowed this information to be communicated (Drager 2010:474).

Since the concept of the sociolinguistic variable was introduced, much work has focused on identifying the correlation between speaker production of different variables and the social context or characteristic with which variation in the use of these variables can be indexed. Language, however, is not a unidirectional phenomenon. Humans use language to communicate thoughts and ideas with other language users. Thus, production is only half of the language equation. The other half lands in the realm of perception and how listeners perceive speakers and their speech. According to both Drager (2010:473) and Thomas (2002:115), although perceptual studies have played a much smaller role in sociolinguistic research in the past, they are becoming much more common and prevalent in recent years. Campbell-Kibler (2010a:378) asserts the importance of perceptual work in stating, "understanding how language is tied to social space requires understanding not only how people talk, but how they hear language as well." To have a better holistic understanding of language, it is necessary and important to look at variation not only in terms of where, when, and how it is produced but also in terms of how listeners perceive and utilize this variation in forming initial judgments about a speaker.

The primary goal of this study is to contribute to the understanding of the social meaningfulness that may be carried by phonetic variation at the segmental level by addressing one of the questions posed above; from what source(s) do listeners glean social information when briefly exposed to the voice of a stranger? The segmental variation under investigation in this study is word-final alveolar stop deletion (t/d

deletion). The question is whether listeners recognize and utilize word-final alveolar stop deletion in forming an initial opinion about a speaker. Results from this study will provide insight into how word-final alveolar stop deletion affects responses when listeners are asked to rate speakers regarding thirteen personal characteristics.

A secondary goal of this experiment is to identify whether the ways in which people produce different elements of speech affect the ways in which they perceive those elements when produced by others. The question is whether a person's own pattern of production affects his/her opinion of those who exhibit similar patterns or those who exhibit different patterns. Results from this study will add to the growing body of work examining the link between production and perception. However, due to time constraints, the analysis for this part of the data remains incomplete. Production data has been collected; analysis, however, will occur at a later time. For a more detailed discussion of the study and study procedures please refer to chapter 3.

1.1 Research Questions

This study seeks to answer five main research questions:

1. Does the absence or presence of a word-final alveolar stop register (whether consciously or subconsciously) as an important part of the speech signal for participants?

2. Is this segmental variation (word-final alveolar stop deletion) a feature of speech that participants use to form judgments about personal characteristics of a speaker? In other words, does word-final alveolar stop deletion carry sociologically meaningful information for participants?

3. How does word-final alveolar stop deletion affect participants' perceptions of speaker personality traits?

4. How does the gender of the speaker affect participants' perceptions of speaker personality traits?

5. Do participants' own production patterns concerning word-final alveolar stops affect how they perceive specific personality traits in speakers with similar/different patterns of production?

1.2 Research Hypotheses

1. Participants do recognize this segmental variation (word-final alveolar stop deletion) as an important part of the speech signal (whether they are consciously aware of this fact or not). Participants may not be able to explicitly identify the characteristic of speech that causes them to form the opinions about the speaker that they do.

2. Word-final alveolar stop deletion is sociologically meaningful to participants, meaning whether a speaker produces or deletes word-final alveolar stops is a feature of the speech signal that participants use to form judgments about the personal characteristics of a speaker.

3. Word-final alveolar stop deletion does affect participants' perceptions of speaker personality traits.

   Traits associated more closely with *competence* (intelligent, educated, successful, wealthy, formal, dependable, and old) will receive more favorable ratings when word-final alveolar stops are pronounced.

   Traits associated more closely with *likability/solidarity* (friendly, laid-back, polite, sincere, hardworking, and kind) will receive more favorable ratings when word-final alveolar stops are deleted.

4. Female speakers will be rated neutrally or more favorably than male speakers when word-final alveolar stop deletion occurs. Gender will not have a significant effect on ratings when deletion does not occur. The relationship between gender and language is complex and has received much attention in the available literature (though not all sources agree on the interaction between gender

and language). This hypothesis was formed in keeping with the results from a number of studies that examined the effects of gender on language (see Drager 2011, Edwards 1979, and Plichta & Preston 2005).

5. Participants' individual productions will have an impact on their perceptions of speaker traits. The relationship between production and perception is complex and not easy to tease apart. Based on available literature, production and perception have been shown to interact. This hypothesis is based on the results of studies investigating the link between production and perception (see discussion of Fridland et al. 2005 and Fridland & Kendall 2012).

2. LITERATURE REVIEW

Although people may believe the language they use in their daily lives is fixed and unchanging, human language is actually filled with considerable variation. But how is variation in language explained? What regulates the variation that abounds in language? And more importantly, what benefit does it provide its users? Linguists have often analyzed variation by looking for different systematic patterns of use and the linguistic factors that are seen to condition this systematic use of one variant rather than another. Meyerhoff (2006:10) describes these factors as "the constraints on the variable" because they constrain the use of a specific variant to a particular linguistic context. An individual segment might exhibit variation due to the influence of individual features carried by the segments that surround it (i.e. +/- voice, +/- continuant, etc.), the placement of stress, or even the location of the segment in the syllable. This sort of variation has long been a focus in the fields of phonetics and phonology as it provides a method to gain better understanding of what speakers know about their own language and how languages work (Foulkes 2006:409-410).

Not all variation can be explained in such a straightforward manner, however. Linguistic constraints are not the source of all variation found in language. Until recently, variation not conditioned by linguistic factors was grouped together into a category called FREE VARIATION, which essentially meant that a rule governing the use of different forms could optionally apply, unmotivated by any sort of predictable linguistic context. According to Meyerhoff (2006:10), "the only thing that is free about free variation is that it frees the linguist up to dust their hands and say 'Ok, weve analyzed that!' " The idea of free variation ultimately adds very little to the understanding of variation in language because it doesn't offer any sort of explanation for or insight into what motivates it. The question then remains, how do so many

speakers exhibit the same sorts of variation if this variation is completely random and unconstrained?

Thanks to the work of sociolinguists who have examined this unconstrained variation from a different perspective, recognizing that language use is a complex and interactive social process, the last fifty years have seen a decline in the appeal of using the category of free variation. Emerging from the work of sociolinguists is the idea that other, non-linguistic factors can and do condition the variation observed in language and that by considering these other factors, a great deal of free variation can be explained (Meyerhoff 2006:10). The recognition that social factors have an impact on the variation found in language greatly expanded the boundaries of linguistic inquiry. William Labov's work with the centralization of diphthongs on Martha's Vineyard helped to establish the use of social constraints in the analysis of variation (Meyerhoff 2006:17). The use of centralized diphthongs can usually be explained by linguistic factors. In dialects that exhibit centralization, a diphthong followed by a voiceless segment will centralize while one followed by a voiced segment will not. Labov found that the variation he encountered could not be explained completely by linguistic conditioning. However, if he also included several social factors in his analysis, the picture of variation became much clearer. He found that people who were more invested in a traditional island life tended to have higher rates of centralization than those more interested in mainland culture. Ultimately, and more generally, he found that certain groups of people tended to use different variants more frequently than other groups and that they used them for specific purposes, namely to maintain a distinct identity (Meyerhoff 2006:20-21). In this way, variation in speech production can be accounted for by looking at how different social factors correlate with the use of each variant.

With the introduction of the sociolinguistic variable, the social function of language has received greater attention within the field of linguistics. Sociophonetic variation, which Foulkes and Docherty (2006:411) explain "refers to variable aspects of phonetic or phonological structure in which alternative forms correlate with social

factors" has largely been studied by examining variation in production. Although production studies investigating sociophonetic variation have provided invaluable insights into the social nature of language use and have allowed sociolinguists to make broad social categorizations about various sociolinguistic variables and the speakers that use them most frequently, these studies only tell half of the story. Language is used for communicative purposes, providing the vehicle with which a person may transmit his/her thoughts and ideas to another person or group of people. Use of language therefore relies not only on the production of speech but also on the perception of it. To achieve a more complete understanding of human language, it seems necessary that linguists must not focus solely on production but also look at perception of speech. Production studies have established that socially conditioned variation occurs in the production of speech which, in turn, raises several questions concerning sociophonetic variation and listener perception. Are listeners aware of this variation? Do they pay attention to it? Does this variation carry any meaningful significance for them?

It is commonly acknowledged in the field of sociolinguistics that perceptual studies are much less common than are production studies (see Drager 2010, Fridland & Kendall 2012, Campbell-Kibler 2010, Foulkes & Docherty 2006, Thomas 2002). Recent years, however, have seen an increase in perceptual work. Sociophonetic perceptual studies allow investigators to identify how variation and social information interact and the effects this interaction may have on the listener's attitude towards or understanding of others' speech. Thomas (2002:115) indicates that because perceptual experimentation has not been a major part of sociolinguistic work that it is an area rich with possibilities. Support for this claim's accuracy is found in Drager's (2010:473) statement:

> A growing body of work demonstrates a link between social factors and variation in perception; not only do individuals produce phonetic variables in socially meaningful ways, they perceive speech differently depending on trends in their own production, their previous experience with other

> dialects, and the social characteristics that they attribute to the speaker. Additionally, listeners make judgments about a speaker based only on hearing their speech, attributing social characteristics and assigning broad social categories in consistent ways.

Though perception is a relatively new topic in linguistic investigation, there is already a large body of work to sort through and examine. Topics addressed by these studies are varied and complex. As varied as the topics may be, one thing is shared by all: the relationship between variation, social meaning, and listener perception is complex and frequently not straightforward. Thomas (2002:117), in a review of perceptual work, concludes that there are five major sociolinguistic questions that research attempts to address:

> (1) the ability of listeners to identify the regional dialect, ethnicity, or socioeconomic level of speakers; (2) how stereotypes can influence the perception of sounds; (3) the presence of vowel mergers or splits in perception; (4) how dialectal differences affect the categorization of phones; and (5) stereotypical attitudes, which are investigated by having subjects assess the personality of a speaker, the speaker's suitability for particular jobs, or other personal traits of the speaker.

Of special interest is topic five, as the goal of this study is to establish the types of personality traits that are attributed to a speaker due to the presence or absence of word-final alveolar stops as well as the interaction that speaker gender may have with this sociophonetic variable on perceived personal characteristics. In examining the literature most closely related to the topic under investigation, it seems that the method for studying sociophonetic variation falls into one of two major categories. The first method provides listeners with some sort of social priming and then observes the effect(s) that this information has on how listeners perceive or categorize the variant that they hear. The second method does not prime listeners with extra social information, but rather manipulates a single variable or multiple variables and

measures the impact this manipulation has on the listener's perception of a speaker's personal characteristics.

When conducting an experiment, the use of participant priming is fairly common. This involves exposing different groups of participants to some sort of extra information in order to examine the impact this information has on participants' responses. This technique has been used a great deal in perceptual studies to observe the effects of varying social information on the categorization of different sociolinguistic variables. This method allows researchers to begin to untangle the complex connection between perception, social meaning, and sociolinguistic variation. Niedzielski (1999), for example, primed participants with information about the nationality of speakers in order to examine if social cues affect the categorization of diphthongs. She divided participants from Detroit, Michigan into two groups. One group was told that they were hearing a speaker from a nearby Canadian town while the other group was told they were hearing a speaker from the Detroit area. Both groups were played the same speech produced by the same speaker, who was from Detroit. They were tasked with choosing which vowel they heard in various token words from a list of six resynthesized vowels. The results showed that participants identified raised variants of the diphthong for the speaker labeled "Canadian" much more frequently (in a statistically significant manner) than they did for the same speaker labeled "Detroit". Interestingly, participants also frequently chose a more standard token than what was actually produced for the speaker labeled "Detroit". Essentially, Niedzielski (1999:69) explains:

> Listeners "hear" the stereotyped raised variant if the speaker fits the social description of someone who is expected to raise it - that is, someone from Canada. If, however, the speaker does *not* fit this social description - if the speaker is believed to be from Michigan - then listeners are less likely to "hear" or notice the raised variant.

Participants were primed with information concerning nationality while taking part in a study that examines the effects of a linguistic stereotype often linked to nationality. The results indicate that available social information can affect the perception and categorization of vowels.

Similar to Niedzielski (1999), in a study examining the influence of age on the categorization of vowels undergoing a chain shift in New Zealand, Drager (2010) primed participants with social information. However, instead of utilizing social information about nationality, Drager primed participants with information about speaker age. She hoped to investigate whether the perceived age of a speaker would affect the perception of the vowel produced. Because this is a change in progress, speakers of different ages exhibit different levels of shifting in their vowel inventories, with older speakers showing the least degree of change and younger speakers showing the highest degree of change. Participants were played token words while being shown a photograph of the "speaker" and were asked to identify the words that they heard. Drager found that older participants were more likely to perceive a shifted vowel when the token word was accompanied by a photograph of a younger speaker. The same effect was not present in younger speakers. Drager (2010:116) concludes that "... this result supports the hypothesis that the age attributed to a speaker can affect the perception of vowels undergoing change". Participants used available social information to help identify the vowels being produced and different social information resulted in different categorization of vowels (for some speakers). Similar studies examining the effects of social information on perception of linguistic variables can also be found in a number of other studies (see Lambert et al. 1960, Hay & Drager 2010, MacFarlane & Stuart-Smith 2012).

The results of this body of work are fascinating and help provide evidence that a relationship does indeed exist between social information and segmental variation and that people make use of this relationship in the perception of speech. As interesting as these studies are, their approach to studying the relationship between social information and variation differs significantly from this study. These studies provide

solid evidence that by manipulating social information, listeners' perceptions of sociolinguistic variables in speech can be affected. But, if the equation is reversed, can similar information about social meaning be identified simply through the manipulation of sociolinguistic variables? Does the manipulation of a sociolinguistic variable (producing one variant versus another without changing anything else in the speech signal) provide listeners with social information? If, for example, the participants in Niedzielski's study were played raised and unraised variants of the diphthongs, would they assign social categories to the speakers? How would they rate speakers based only on hearing differences in the vowels produced? Would they attach any social meaning to the differences in the production of the vowels that they hear? The next section examines a number of studies that were designed around manipulating sociolinguistic variables in order to observe the effect this manipulation has on how listeners rate speakers regarding varying social characteristics. Essentially, these studies sought to identify what sorts of social information a sociolinguistic variable can carry or be indexed with.

A number of studies have looked at attitudes towards speakers based on larger dialectal types of differences in speech. This section will begin with a discussion of broader linguistic variation and its impact on how participants perceive speakers and proceed to a discussion of work focused on much narrower segmental variation and the impact it can have on participants' perceptions of speaker traits.

Baugh (2007:338) presents a discussion about linguistic discrimination or "linguistic profiling". As a speaker capable of easily and naturally switching between three different dialects of English (i.e. African American Vernacular English, Chicano Vernacular English, and Standard American English), Baugh performed a number of matched guise experiments. He investigated housing discrimination by examining the different responses he received from landlords when telephoning to inquire about a housing opportunity in each of his three different guises. He always spoke the same sentence, but he would change the dialect in which he was speaking. His results showed that when using one of the more "non-standard" dialects, he was able to

schedule many fewer appointments to see the apartment or house in question than when he was using Standard American English. As Baugh (2007:340) states, "positive replies to requests in Standard English frequently followed prior rejections of the ethnic non-standard dialects". This publication emphasizes the idea that people hear speech and "speculate" (Baugh 2007:341) or draw conclusions (whether they are accurate or not) about a speaker's gender, ethnicity, race, age, sexuality, and other various traits based largely on variation contained within the speech signal.

Edwards (1979) performed an experiment that looked at teacher perceptions of "disadvantaged speech" in school aged children. Edwards had two groups of students, one considered "disadvantaged" and the other not. "Disadvantaged" here largely correlated to students at a lower socioeconomic level than those not considered "disadvantaged". The aim of the study was to see how a group of student teachers would evaluate the speech of the two different groups of students based solely upon a recording of them reading a passage aloud and according to Edwards (1979:27), was meant to look at "the perceptions of speech". The teachers were asked to judge the speech on a number of characteristics ranging from fluency to intelligence and level of happiness. The results from this study showed that "on every scale the disadvantaged children received significantly less favourable ratings than their nondisadvantaged counterparts" (Edwards 1979:30). Something in the speech of these "disadvantaged children" caused the listeners to perceive them as having lower ratings than those of their middle-class counterparts. According to Edwards (1979:36), "all agreed that one's way of speaking was very important in terms of the clues it afforded to other aspects of personality". Though specific sociolinguistic variables were not mentioned by the author, one can only wonder about what exactly was prompting the listeners to consistently rate the children from a lower socioeconomic position lower than those from the higher socioeconomic position. Which variable was accessible and meaningful to the listeners? Perceptual experiments such as this show that listeners, even when unaware, can and do perceive different sociolinguistic variation and that this variation undoubtedly can and does carry different stereotypes and meaning for listen-

ers. Further investigation would help shed light on the type of variation that allowed listeners to rate children differently along a number of different characteristics.

Plichta and Preston (2005:117) conducted a study examining the effect that the degree of monophthongization in the production of the vowel /ay/ has on participants' ability to place speakers on a gradient scale running from north to south. Monophthongization of this vowel is often associated with being from the south and they were interested to see if non-linguists could use subtle changes in the degree of monophthongization to determine where a speaker might be from. Plichta and Preston (2005) recorded a male and female speaker saying the word *guide* and then manipulated the vowel to produce resynthesized versions of the word that ranged from full diphthongizaton to full monophthongization (a total of seven distinct acoustic levels). Participants were asked to listen to a randomized list of the different versions of *guide* and to indicate on a map, labeled with cities ranging from north to south (Saginaw, MI to Dothan, AL), where they believed the speakers to be from. Results from this study showed that participants were able to make use of the variation in monophthongization to identify perceived regional origin (Plichta and Preston 2005:120), though most participants believed that they could not even distinguish the different versions of the vowel (Plichta and Preston 2005:125-126). According to Plichta and Preston (2005:128):

> As a result of this work we believe even more strongly that finely-grained acoustic differences are not only the basis for investigations of actual sound systems and changes in progress but may also be manipulated in experimental settings to confirm perceptual salience in such tasks as social category identification.

Word-final alveolar stop deletion may not be salient for (all) speakers, but this study lends support to the idea that even subtle differences in production that occur below the level of consciousness may affect perception of speakers and their speech. Variation in this phonetic variable was used to elicit information about the perceived regional category of a speaker. Perhaps such variation studies could also be used to

identify finer details (e.g. personality traits) about how listeners perceive speakers and their speech.

Campbell-Kibler (2007) examined another well studied sociolinguistic variable, (ING) and the effects of variation on listener judgments about speaker traits. Many dialects show variation in the production of this variable as either [ɪn]/[ən] or [ɪŋ], though [ɪn]/[ən] are often identified as being stereotypical of Southern speech (Campbell-Kibler 2007:33). She performed a series of between subjects matched guise experiments using speakers from both North Carolina and California. For each of the speakers, she recorded their natural speech and then created two separate guises by digitally inserting the [ɪn]/[ən] or [ɪŋ] variants into the speech. Participants performed several tasks such as rating speech on a six-point scale for a number of characteristics as well as selecting traits that best represented the speaker from a list of different descriptions. Campbell-Kibler's (2007:47) results indicated that participants rated speakers lower in terms of perceived education and articulateness when they were heard in the [ɪn]/[ən] guise, whereas speakers in the [ɪŋ] guise were more often seen as being educated and articulate. Listeners also perceived the [ɪn]/[ən] guise to be more accented when associated with a speaker from the South than from anywhere else (Campbell-Kibler 2007:46-47). Campbell-Kibler points out that the interaction between the (ING) variable, perceived regional membership (accent), and the content of the speech is very complex. In a later article examining the same variable, Campbell-Kibler (2009) indicates that the meaning of a variable may not be fixed, but rather may vary depending upon other information available to the listener. Campbell-Kibler (2009:136) states, "I propose that (ING) can usefully be thought of as inhabiting an indexical field, within which it shifts based on the other cues, linguistic and nonlinguistic, available to the hearer."

The studies mentioned above, though much more intricate than this study, do indicate that sociolinguistic variation can affect the way that a speaker is perceived. Even though this study is less complex in its design than other perceptual studies, looking at only a single sociophonetic variable, it appears to be an appropriate starting

point. Because so little information exists on the perception of word-final alveolar stop deletion, starting with a simpler study to determine a baseline for the variable and its saliency for listeners seems to be a good first step in unraveling the complexities of this variable.

A good question might be, "Why word-final alveolar stop deletion?" The occurrence of word-final alveolar stop deletion has been studied extensively, something a simple search of the literature will quickly indicate. Like much work in experimental sociolinguistics, the studies performed on this variable have been done from the perspective of production. The great news about this, is that the experiments have been replicated numerous times, which lends strength to their validity. Within the literature, however, there is a noticeable gap when it comes to listener perceptions of and attitudes towards speakers who exhibit deletion of this variable. A small pilot study indicated promising results that listeners perceive (though maybe not consciously) this variable and that its presence or absence affects how listeners rate speakers concerning different personality characteristics. This research study represents an initial step towards addressing the gap in the literature surrounding word-final alveolar stop deletion.

A second question might be, "Why look at the gender of the speaker?" A simple Google search for "Do men speak differently than women?" yields pages of results filled with everyday people explaining why men and women ultimately speak in different styles. This study seeks to identify whether an average person rates speakers differently due to the presence or absence of word-final alveolar stops. If participants believe that people of different genders speak differently (as the Google searches mentioned above seem to imply), then gender of the speaker could have an impact on the participants' judgments. Including only speakers of a single gender would not solve this problem as it would not eliminate any subconscious biases that a participant may hold about the gender of a speaker. By including speaker gender as a variable, it allows trends in the data to be seen and interactions of the variables to be evaluated more transparently. From the perspective of linguistics, gender has frequently been

shown to influence perception. According to Gallois and Callan (1981:349), " . . . voice qualities associated with the sex of the speaker may exert an important influence on listener perceptions. There is ample evidence for strong stereotypes about the personality characteristics of men and women." Meyerhoff (2014:93) explains that women have been found both to use more standard variants in variables that language users are consciously aware of but that they tend to use more innovative (or non-standard) variants when the variation is below the level of awareness. A number of the articles discussed earlier looked at speaker gender. Drager (2011:113-114) discusses the role of speaker and participant sex in her vowel perception experiment. Concerning the vowels undergoing the shift in New Zealand, female speakers tended to produce more raised vowels than male speakers did and Drager (2011:113-114) found that males were less likely to hear a raised but ambiguous vowel correctly. Though the exact cause of this difference is not clear, that there exists a difference between the genders is.

Edwards (1979) also found a difference in how children's speech was rated in terms of the sex of the speaker. He found that a difference in ratings only occurred in the group of children labeled "nondisadvantaged". In this group, female speakers were consistently rated more positively than male speakers regarding a number of characteristics (1979:30).

In analyzing the monophthongization of /ay/, Plichta and Preston (2005:121) found that female speakers (at any given level of monophthongization) were consistently and significantly rated as being from a location further north than male speakers with the same level of monophthongization. Plichta and Preston (2005:123) theorized that this difference could be attributed to the long-held belief that women use more standard variants than men and that ". . . respondents are less willing to associate a female voice with a region which is more stigmatized, i.e. the US south. . . ". Based on just a small sampling of the sociolinguistic studies that have been done, it seems that speaker gender can have some significant and interesting effects on how participants perceive variables and the characteristics of those who produce these

variables. By including gender in this study, the aim is to provide a clearer and more complete picture of the data than if only word-final stop deletion were analyzed.

A smaller part of this experiment involves looking at the interaction between a participant's production of word-final alveolar stops and how the production of this variable affects or influences his/her attitudes towards speakers who produce it and those who delete it. Essentially, this portion of the study seeks to identify if one's own production creates a sort of 'in-group' mentality and thus results in rating speakers with similar production patterns more favorably in terms of personal characteristics. A number of studies have been done looking into the relationship between production and perception. This section focuses on two of these. The first discusses how production interacts with categorical perception of a variable. The second examines production and how it interacts with participant ratings of personal characteristics.

Fridland and Kendall (2012) examined the interaction between the production and perception of mid front vowels. Participants from three dialectal regions (North, West, and South) were asked to listen to recordings of vowels that had been synthesized along a continuum with /e/ and /ɛ/ as the endpoints. They were then asked to choose a word that best fit the vowel that they had heard in order to identify at what point perception of /e/ became perception of /ɛ/. A small number of participants were also recorded reading a word list and a paragraph which were then used to examine the relationship between how individuals produce these vowels and how they perceive them. The results of the study indicate that both regional norms and personal productions affect the ways in which participants perceived the vowels along the /e/-/ɛ/ continuum (Fridland and Kendall 2012:792). Fridland and Kendall (2012:792) speculate that "... perception appears to depend both on what you yourself produce (i.e. as an individual speaker) and who you are more generally (i.e. as a member of a specific community)."

Fridland, Bartlett, and Kreuz (2005) examined how the production of vowels undergoing a shift in southern dialects of English interacted with *education* and *pleas-*

antness ratings assigned by speakers of a southern dialect. Vowels were partially synthesized along a continuum to reflect non-, moderate, and extreme shifting and particular attention was paid to /ey/, /ɛ/, /uw/, and /ow/ as being important members of the vowel shift (Fridland and colleagues 2005:371-37). Participants were asked to rate speech tokens concerning perceived levels of *education* and *pleasantness*. The overall results showed that if a variant was considered a southern variant (/ey and /ow/ especially), it was rated lower for *education* and *pleasantness*. Fridland and colleagues (2005:382) explained that in this study, "... it does appear that strongly regional or local speech is subject to more negative judgments than speech with no Southern association." Perception of social characteristics seemed to be influenced by familiarity with the production of these variants in that non-local productions were rated more favorably than locally produced variants. Ultimately, this article illustrates the complexity of untangling the relationship between production and perception. According to Fridland and colleagues (2005:382), "... results suggest that the link between production and perception is not straightforward or simple, with perceptual judgments depending on both linguistic and social information." By looking at the relationship between production and perception of word-final alveolar stop deletion, this study seeks to contribute to the understanding of this incredibly complex interaction.

3. EXPERIMENTAL DESIGN

Language involves not only encoding and sending messages (production) but also decoding and receiving them (perception). An interesting question lies in the nature of the relationship between these two facets of language: how does the way a speaker produces a message impact the ways in which a listener perceives not only the message but also characteristics about the speaker in general? The primary goal of this study is to examine whether word-final alveolar stop deletion carries important social information or activates any stereotypes that might affect the way a listener views a speaker. A secondary objective of this study is to examine the relationship (if any) between how listeners themselves produce this variable and how they in turn perceive this variable when produced by others. Permission to complete this study was granted by the Purdue IRB and the study was assigned protocol number 1702018768. The following sections provide an in-depth discussion of the experimental design and procedures.

3.1 Methodology

Each participant in this study listened to eight paragraphs, half of which were original, unmanipulated recordings and half of which had been modified using Praat (Boersma & Weenink 2016). After listening to each paragraph, participants were tasked with rating each speaker regarding several characteristics, based on their initial reaction to the recorded speech. Each group of participants heard only one version of the recording (original or modified) for each of the eight speakers. Both groups of participants heard the same speakers' voices, but participants belonging to one group never heard the same version of a recording as participants belonging to the other group. Each group heard each speaker but in the opposite guise as the other group.

For example, if Group One was played the unmodified recording for Female Speaker 1, then Group Two was played the modified recording for Female Speaker 1. This design ensured that participants in each of the groups heard stimuli for each of the speakers that differed only in the presence or absence of word-final alveolar stops. Fig. 3.1 provides an illustrated guide for the experimental design.

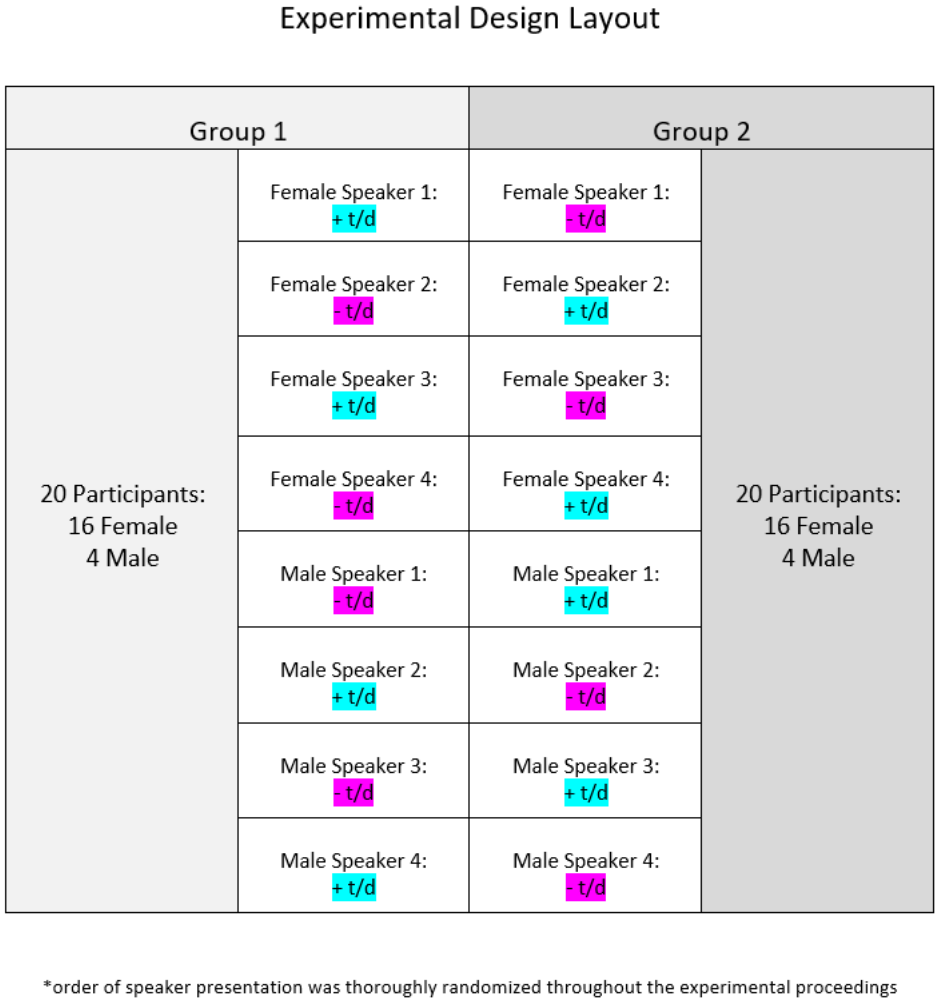

Figure 3.1. Experimental Design

The secondary aim of this study is to examine if any relationship exists between how participants perceive the presence or absence of word-final alveolar stops and how they themselves produce words containing this variable. The basic question is

whether a person's own production of a variable affects how they perceive that same variable in others' speech. To examine this question, each of the participants was recorded reading a short passage (Appendix C) similar in content to that used in the listening component (Appendix B) of the experiment. This passage included twenty target words each of which contained a word-final alveolar stop. Because of the Observer's Paradox, it is difficult to obtain completely natural speech in such a formal experimental environment (Labov 1972:209). In order to minimize the effects of this more formal and somewhat artificial environment, the content of the paragraph describes a more casual or informal subject, specifically the act of baking a home-made pie crust. Each participant was asked to read the paragraph aloud three times in as normal a manner as possible leaving a short pause between each reading. Repetition of the same paragraph was employed in order to elicit more natural speech production. By the third reading, participants were hopefully comfortable enough not only with the content of the paragraph but also with the experimental environment that their speech would more closely reflect their normal every-day usage rather than the more formal patterns often observed in an artificial experimental environment. All participants were recorded reading the paragraph aloud before they completed the listening/perceptual portion of the experiment.

3.2 Variables

Dissecting the complex connections between a sociolinguistic variable and the information that it carries can be a complex and arduous process. In the pilot study for this experiment, a single independent variable was manipulated: the presence or absence of word-final alveolar stops. In this experiment, a second independent variable, speaker gender, was included in the design as well. Each of the two independent variables has two levels. Word-final alveolar stops could either be present or absent. Speaker gender could be either male or female.

The dependent variables in this experiment are whole number response values (ranging from -3 to 3) for thirteen different personality traits or personal characteristics. A more detailed description of these whole number response values can be found in section 3.5 in the discussion of semantic differential scales. The characteristics included in this experiment were chosen due to the frequency with which they were used in similar attitudinal studies examining the relationship between social meaning and linguistic information (see Gallois & Callan 1981, Levon 2014, Campbell-Kibler 2009, Fridland et al. 2005). Characteristics under study have often been grouped into two categories: *competence* and *likability* (Levon 2014: 547), or *competence* and *solidarity* (Fridland and colleagues 2005:370). This will be an important distinction, as those characteristics related to a speaker's *competency* are hypothesized to receive more favorable ratings when alveolar stops are pronounced while those related to a speaker's *likability* are hypothesized to have more favorable ratings when alveolar stops have been deleted. The characteristics were given as polar values on a seven-point semantic differential scale and include the following: (*competence*) intelligent, educated, successful, wealthy, formal, dependable, young, (*likability*) friendly, laid-back, polite, sincere, hardworking, and kind. This study intends to identify whether the deletion of word-final alveolar stops and the gender of a speaker affect listener perceptions of the speaker regarding thirteen different social or personality traits.

3.3 Participants

The initial goal was to recruit fifty participants to participate in this experiment. Due to time constraints surrounding data collection, however, a total of forty-two participants actually completed the experiment. Two participants' data were excluded. One participant did not meet the study criteria and the other participant failed to listen to the entirety of one speaker's recording. For further discussion of this, please refer to section 4.1 in which the study data is analyzed in greater detail. All participants were recruited from the student, staff, and faculty populations on the

campus. The age of participants ranged from eighteen to over fifty, though the age of the majority of participants landed somewhere between eighteen and early twenties. All participants were required to be native speakers of a Midwestern dialect of English. Any data from L2 English speakers or speakers of a non-Midwestern dialect of American English was excluded. Each participant was randomly assigned to one of two groups. Group assignment determined which recording (original or manipulated) that participants would hear for each speaker. Ideally, half of the recruited participants were to be male and half were to be female. In reality, each group had seventeen female and four male participants. The number of male and female participants in each group was carefully monitored to keep the distribution of genders equal across groups. Participants were also randomly assigned a participant number ranging from 001 to 050. At the conclusion of the experiment, participants were given a demographic survey that included questions about their age, language exposure, and where they grew up.

3.4 Stimuli

Eight speakers were recorded reading the same semantically neutral paragraph (Appendix B) containing eighteen token words, each having a word-final consonant cluster ending in an alveolar stop. An important clarification to make is that not all words containing word-final alveolar stops were considered target words. Target words were all monomorphemic. Only word-final alveolar stops that preceded another word beginning with a consonant were considered target words. Words ending in a [t] or [d] that preceded a natural pause in speech (i.e. following a comma or period) or that were followed by a word with an initial vowel were not included in the list of target words. The reason for not identifying such words as target words is that many production studies have shown that in these phonetic environments, deletion of the alveolar stop is less likely to occur. If these words had been included and had been

manipulated, the recordings might have seemed less natural to participants, possibly introducing a new confounding variable into the study.

Each speaker was instructed to read the paragraph in as normal a manner as possible while also paying close attention to the articulation of the alveolar stop in each of the underlined target words. Speakers were given adequate time to practice reading and to become familiar with the paragraph before recording occurred. Once speakers felt sufficiently comfortable with the content of the paragraph, they were recorded in a noise attenuating room in a quiet lab. Each recording was then examined closely using Praat (Boersma & Weenink 2016) to ensure that the speaker clearly produced the alveolar stop in each of the target words. The speakers rerecorded the paragraph until each target word had a clearly pronounced alveolar stop. The original recordings were saved as uncompressed WAVE (.wav) files. Using Praat (Boersma & Weenink 2016), the word-final alveolar stops were removed manually from the target words in the original recordings. Each of the modified paragraphs was also saved as a separate, uncompressed WAVE (.wav) file.

Modifying the original recordings was a challenging yet critically important element in the design of this study. On the surface, it sounds fairly straight forward: remove specific alveolar stop consonants from the stream of speech. Realistically speaking, this task presented a number of challenges. The ultimate goal was to have manipulated recordings that sounded unmanipulated and to change as little as possible within the acoustic signal while still maintaining speech that sounds natural. In an ideal situation, the alveolar stop could simply be removed, and small amounts of silence could be inserted to replace the acoustic material that had been removed. However, more often than not, inserted silence ended up sounding very unnatural and drew significant attention to the location of the manipulation. In order to address this issue, a compromise had to be reached. Rather than insertion of silence, often a sound that preceded or followed the deleted alveolar stop needed to be extended enough to maintain the naturalness of the speech. The extension of surrounding sounds could potentially introduce an unanticipated confound, however, in order to avoid obvious

and unnatural manipulation this technique was used when insertion of silence was not a viable option.

The word final cluster of sounds in each of the target words varied and included the following combinations of sounds: [s] and alveolar stop (e.g. first), [n] and alveolar stop (e.g. hand), [l] and alveolar stop (e.g. fold), and non-alveolar stop and alveolar stop (e.g. inspect). The environments immediately following word-final alveolar stops were also carefully considered. Sentence structures where pauses would be natural and words beginning with vowels were avoided because previous studies have shown these environments to be associated with lower rates of alveolar stop deletion. Also, the word following the target word could not begin with an alveolar stop as this would create an environment in which it would be impossible to identify whether deletion had occurred or not. In short, each target word was placed carefully before a word that began with another, different consonant sound. Words were also carefully selected to ensure that the sound immediately following each of the target words was varied. Initial sounds immediately following the word-final alveolar stops included voiced and voiceless fricatives, liquids, nasals, voiceless stops, and [w]-glides. [j]-glides were excluded due to the interaction that often occurs between this type of glide and a preceding alveolar stop. In the pilot study for this experiment, it was found that speakers often produce a more affricate-like sound when a word-final alveolar stop was directly followed by a word beginning with a [j]. When immediately followed by a [j], [t] often sounds more like [ʧ] and [d] often sounds more like [ʤ].

Fricatives (i.e. [s]) were frequently part of the word-final cluster of sounds in the target words and so they were often extended to create a more natural and less abrupt transition. Because the acoustic signal of a fricative is noise, it was much more forgiving than the acoustic signal of sounds that were more sinusoidal and regular. This made it easy to remove phonetic material and replace it by extending the fricative, all while also maintaining a very natural sounding transition. Fig. 3.2 shows the unmanipulated waveform for the word *first*. The box indicates the acoustic material that was deleted from the signal in order to remove the final alveolar stop. Approximately

95 ms was cut out of the acoustic signal. Fig. 3.3 shows the manipulated waveform of the same word. The box indicates the roughly 3 ms of the preceding fricative that was added to the signal to create a more natural transition.

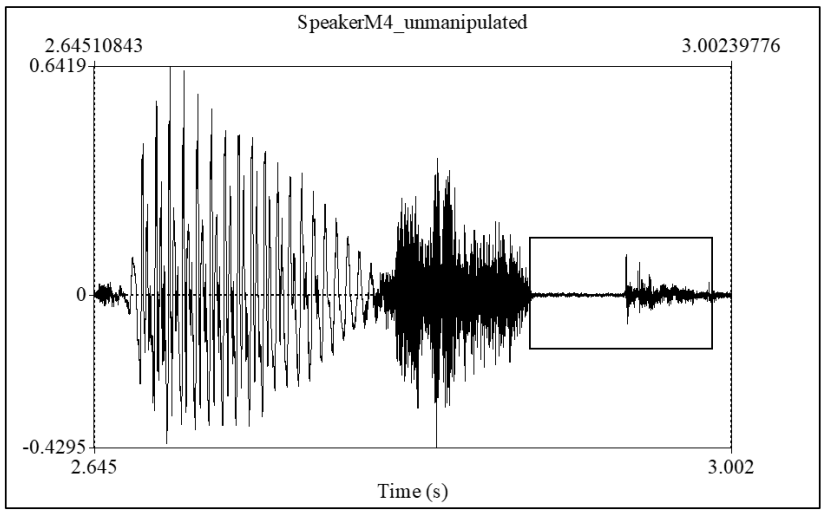

Figure 3.2. Unmanipulated waveform for the word *first* showing presence of word-final [t]

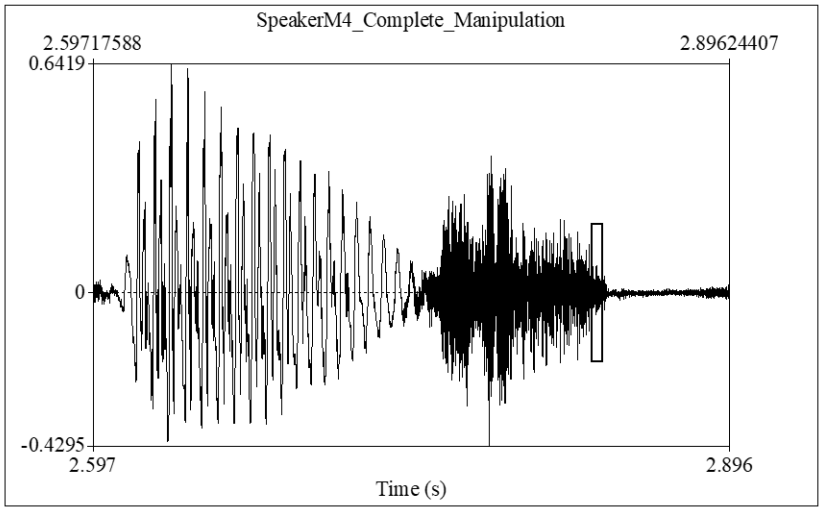

Figure 3.3. Manipulated waveform for the word *first* showing deletion of word-final [t] and added phonetic material

Nasals (i.e. [n]) due to their frequency of occurrence in the target words, were also frequently extended in order to help create a more natural sounding transition after the removal of an alveolar stop. In order to extend a preceding or following nasal, individual cycles of the wave were identified. A cycle of the wave was then copied and pasted into the existing acoustic signal to artificially extend the speech sound and create a less abrupt sounding transition. Fig. 3.4 gives an example of the waveform for the word *different* before the deletion of the alveolar stop and the extension of the preceding nasal. Approximately 70 ms of acoustic material was removed from the original recording. The box indicates the material deleted from the recording. Fig. 3.5 shows the acoustic signal of the word *different* after deletion of the alveolar stop and extension of the preceding nasal. The box indicates the 20 ms of the preceding nasal that was extended to create a more natural transition.

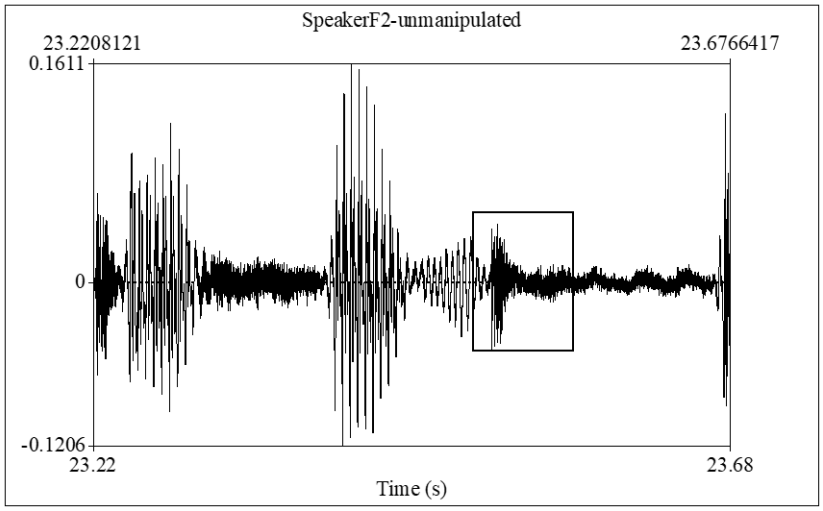

Figure 3.4. Unmanipulated waveform for the word *different* showing presence of word-final [t]

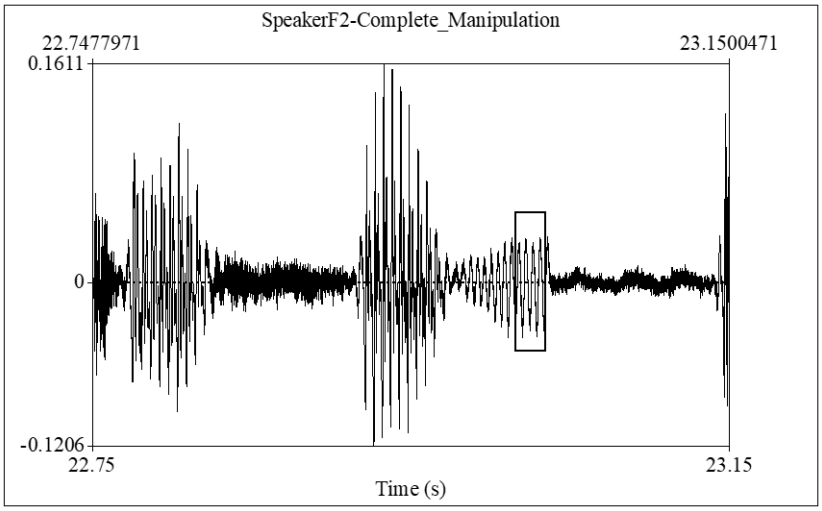

Figure 3.5. Manipulated waveform for the word *different* showing deletion of word-final [t] and added phonetic material

There were many target words that had the alveolar stop removed and sounded natural and unmanipulated without the extension or insertion of any additional acoustic material. In cases where this occurred, after deletion of the alveolar stop, no further manipulation of the acoustic signal was performed. Fig. 3.6 shows the waveform of the word *and* before manipulation. The box indicates the 64 ms of acoustic material that was removed from the original recording. Fig. 3.7 shows the waveform of the word *and* after removal of the [d] for a male speaker. Note that no manipulation beyond the removal of the alveolar stop occurred.

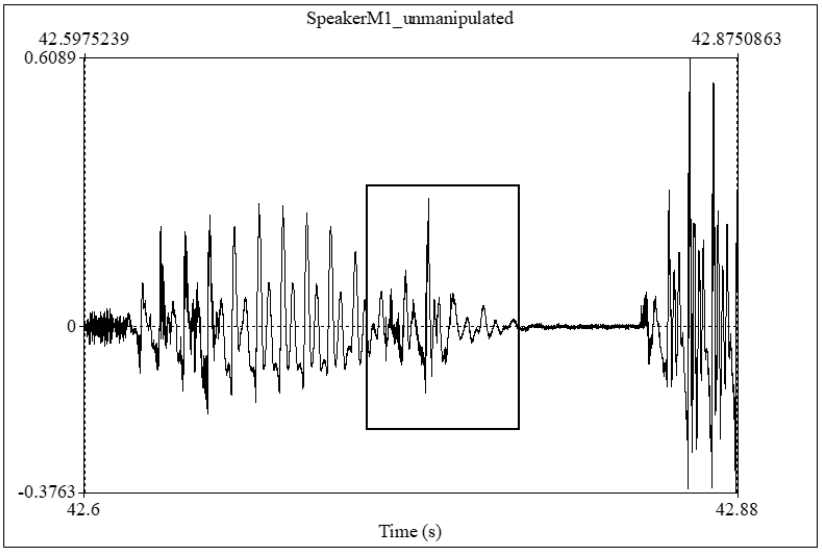

Figure 3.6. Unmanipulated waveform for the word *and* showing presence of word-final [d]

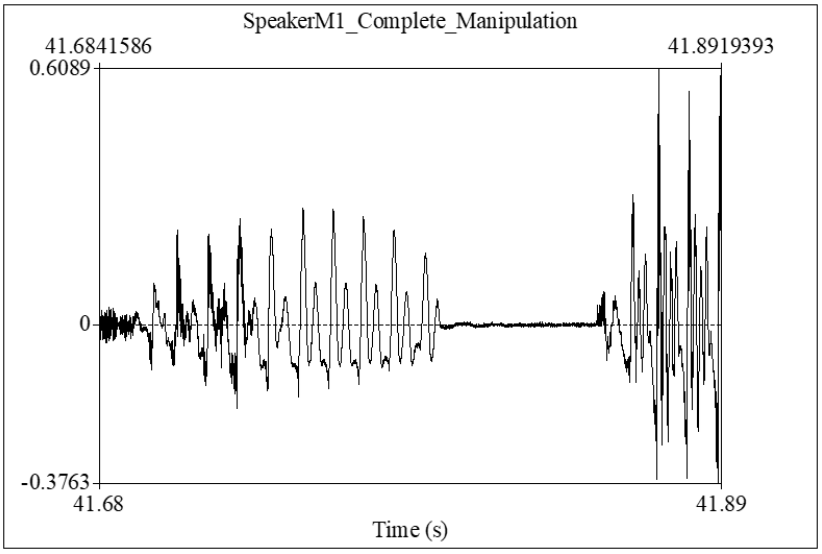

Figure 3.7. Manipulated waveform for the word *and* showing removal of word-final [d] without added phonetic material

Extending preceding or following sounds was not the only way that the audio was manipulated to create more natural transitions. In some instances, insertion of a bit of silence was sufficient for maintaining a natural sounding recording. Removal of phonetic information (in the form of alveolar stops) naturally shortens the time between the production of different sounds in a recording of connected speech. This shortening often resulted in the manipulated speech signal sounding stilted or strangely abrupt. In some cases, removal of the alveolar stop resulted in the manipulated recording sounding as if someone had pressed the 'fast-forward' button on the recording, squishing the end of the target word too closely together with the beginning of the following word. In order to mitigate this fast-forward effect, in cases like this, a bit of silence was inserted between the end of the target word and the beginning of the following word. This silence helped create a more natural spacing between the words in the manipulated recording. The silence was copied and pasted from elsewhere within the recording so that the background noise levels would match and the silence wouldn't stand out as unnatural. Fig. 3.8 shows the unmanipulated phrase *taste one*. The box indicates the 61 ms of acoustic material lost in the removal of the alveolar stop. Fig. 3.9 shows the manipulated acoustic signal for the phrase *taste one*. The box indicates the 24 ms of silence that was copied and inserted into the acoustic signal to maintain the natural spacing between the production of the two words.

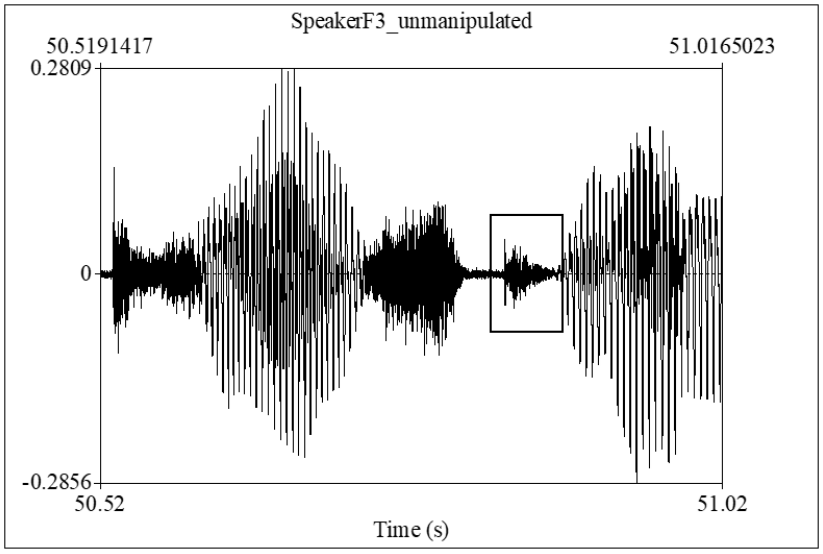

Figure 3.8. Unmanipulated waveform for the phrase *taste one* showing presence of word-final [t]

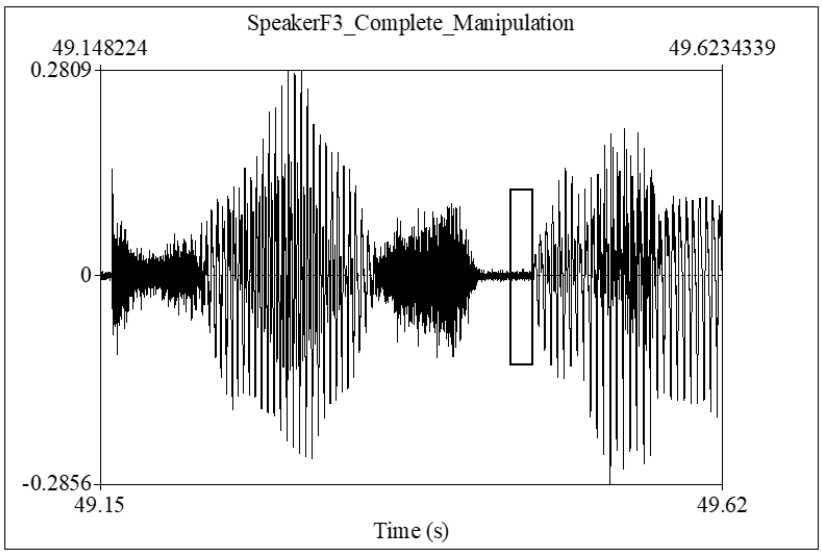

Figure 3.9. Manipulated waveform for the phrase *taste one* showing removal of word-final [t] and added phonetic material

Though close attention was paid to the phonetic environment in which each target word occurred, a few target words were difficult to manipulate without any sort of artifact remaining after removal of the alveolar stop. In cases like this, it seemed that coarticulation was most likely causing the trouble. During manipulation of the original audio files, there were instances where it was impossible to identify where an alveolar stop ended and the next sound began because perceptually they appeared to overlap. Looking only at the waveform, it would seem the stop had been completely removed but upon listening to the resulting audio, traces of the stop could be heard. Cases like this resulted in many very fine adjustments being made until the alveolar stop was no longer perceptible to the ear. One place this occurred was *and remove*. The alveolar stop in *and* and the liquid in *remove* seemed inextricably linked for a number of speakers. The resulting manipulation thus sounded somewhat unnatural because in order to sufficiently remove the alveolar stop, larger amounts of the following liquid [r] needed to be removed as well. Another location within the stimuli paragraph that this coarticulatory effect seemed to occur was with *hold the*. The liquid preceding the alveolar stop was what seemed to cause the problem. The liquid was often short and difficult to separate easily from the alveolar stop. The more rapidly a speaker produced *hold the* the more challenging it was to manipulate the recording with a natural sounding result. Frequently the preceding liquid and the following fricative were extended to help create a more natural transition after the removal of the alveolar stop.

A couple of the speakers who were recorded reading the stimulus paragraph deleted a single alveolar stop within an otherwise perfect recording. Frequently this deletion occurred on one of the instances of the word *and*. Because *and* is a function word, deletion is more likely to occur in it than in other more content based words. In normal everyday speech, reduction of function words is a common occurrence. For the speakers that missed a single alveolar stop in their recordings, the word was simply left unmodified in both guises.

One speaker, however, did struggle to produce consistent alveolar stops in the target words. The fourth male speaker showed a great deal of word-final alveolar stop deletion throughout his recordings. As a result, a complete recording needed to be stitched together from pieces of a number of separate recordings. The first step was to locate the recording with the least amount of deletion. Then, locations that exhibited deletion were identified. The other recordings were sorted through to find suitable substitutions for the parts containing deletion. The substitutions were then copied and pasted into the recording and the bits containing deletion were removed from the recording. The speaker had recorded sufficient acoustic material so that a complete, deletion-free recording could be assembled from the pieces that were taken from several separate recordings. The stitched-together recording was saved as the unmanipulated version for the speaker. The fact that individual parts from multiple recordings had been spliced together to create the unmanipulated version of the paragraph for this speaker was imperceptible. The alveolar stops were then removed from this patchwork recording just as they had been in the recordings for the other speakers.

Each of the two groups heard two of the original recordings (alveolar stops present) for two of the male speakers and two of the female speakers. Participants in each group also heard two of the modified recordings (alveolar stops deleted) for the remaining two male speakers and the remaining two female speakers. Group One and Group Two heard the opposite guise for each of the speakers. If Group One heard the original recording for a speaker, Group Two heard the modified recording for the same speaker. No participant heard the same speaker in both guises. The presentation of the recorded paragraphs was randomized using a Praat (Boersma & Weenink 2016) script to ensure that participants did not hear recordings for the speakers in the same order. Randomization of the stimuli ensured that the order of presentation did not act as a confounding variable by neutralizing the effect that any one specific ordering might have had on participant responses.

3.5 Semantic Differential Scales

Participants were asked to rate each of the speakers regarding several different social and personality traits. A seven-point semantic differential scale was used to capture participants' responses to the recorded speech. In an initial pilot study, a five-point Likert scale was used. This limited the range of responses that participants could give. By utilizing a larger scale, it allowed participants to provide more precise and distinct responses and has contributed more detailed information concerning participant judgments for the final analysis.

Participants were provided a separate semantic differential scale with which to rate each characteristic for each speaker (Appendix F). At one end of the scale, a characteristic was listed and at the other end of the scale, the characteristics' opposite was provided. Characteristics deemed as more negative were not always listed on the left-hand side of the scale and characteristics determined to be more positive were not always listed on the right-hand side of the scale. The polarity of characteristics was also randomized so that participants were required to pay close attention to the characteristic in question and the responses they were providing. Each scale had seven points, labeled as *Extremely*, *Quite*, *Slightly*, or *Neutral*. *Neutral* served as the center point with *Extremely* acting as the two endpoints. Participants were able to select a single point along the scale to represent their attitude towards the speaker regarding the characteristic at hand. For purposes of data analysis, each point on the scale was also assigned a numerical value from -3 to 3. These numbers were not visible to participants. A negative value (i.e. -3) was assigned to the endpoint of the scale containing the more negative version of the trait in question while a positive value (i.e. 3) was assigned to the endpoint of the scale containing the more positive version of the trait in question. Appendix G provides an example of how the labels seen by participants correspond to the numerical values assigned to each label, as well as how the polarity of the traits could be alternated.

At the beginning of the listening portion of the experiment, each participant was given access to a Qualtrics (Qualtrics, Provo, UT) survey. Participants were instructed to record their responses using the computerized survey. Because of the repetitive nature of this study, presentation of the characteristics under examination was randomized using the randomization feature available during the construction of the survey. All participants rated speakers regarding the same thirteen characteristics, however, the order in which participants were presented with the characteristics for each speaker was randomized. This randomization was done to reduce the possible impact of practice effect on participants' response values for each of the thirteen characteristics. Because the order of characteristics differed for each speaker, participants were more likely to pay attention to each item and were less likely to simply assign the same scores in the same order on each page of the survey. The variation in the order of characteristics was intended to cut down on the repetitive nature of the study design. In the pilot study, several participants commented on the fact that the response sheets had the Likert items in different orders indicating that participants were indeed paying close attention to which characteristics they were rating.

3.6 Experimental Procedure

Participants were invited to schedule a time that was convenient for them to visit the lab to complete the study. The study was conducted in a quiet lab in the basement of Heavilon Hall, free from excess noise and distraction. Only one participant was able to participate in the study at a time. When participants arrived at the lab, they were provided an informed consent form (Appendix A). Participants were given as much time as needed to read through and ask questions about the information contained within the informed consent form. If participants did not have further questions, they were asked to sign the document along with the researcher. Participants were offered a copy of the consent form for their records.

3.6.1 Production Task

Participants completed the production component of the study before moving on to the perceptual piece. This was done in order to avoid any possibility of having the recorded speech from the perceptual part influence participants' own speech patterns in the production part. Participants were set up at a desk in a noise attenuating booth. They were provided a short sheet of instructions to read (Appendix D). The short stimulus paragraph participants were asked to read was displayed on a laptop in the noise attenuating booth. The instructions asked participants to read the paragraph aloud three times in their normal speech, leaving a short pause between each reading. Each participant was instructed to take a few moments to become familiar with the paragraph and to notify the researcher when they were ready to record. Participants were then set up appropriately with the microphone and asked to count out loud to ten in order to ensure that recording levels were adequate. Once this step was completed, participants were reminded to read the paragraph aloud three times in as natural a way as possible and to leave a short pause between each reading. The door to the noise attenuating booth was then closed and participants were instructed to begin reading. At the end of the recording session, participants were released from the sound booth and asked to sit at a computer for the second (perceptual) portion of the experiment.

3.6.2 Perceptual Task

For the perceptual part of the experiment, participants were set up at a desk with two computers. One computer displayed a Qualtrics (Qualtrics, Provo, UT) survey for recording responses and the other displayed Praat (Boersma & Weenink 2016) for playing the recorded audio files. In order to ensure that participants felt comfortable navigating the interface between the two computers, a brief practice experiment that mimicked the real experiment was run. Participants played three short audio files and recorded their responses using the provided survey. Upon completion of this brief

practice experiment, participants were set up with the actual perceptual portion of the experiment. The first page of the survey provided participants with a short set of instructions directing them on how the study would proceed (Appendix E). They were asked to rate each speaker using their initial gut reactions to the speech they would hear. Using a pair of noise blocking headphones, each participant then listened to all eight speakers in one of the two possible guises (alveolar stop pronounced or deleted). The guise participants heard for each speaker depended on the experimental group they were randomly assigned to. The audio files were completely randomized using a Praat (Boersma & Weenink 2016) script. This randomization was done to avoid playing all the recordings in a fixed order, an occurrence which could introduce another confounding variable. After listening to each speaker, participants were given as much time as needed to record their responses on the semantic differential scales for each of the thirteen characteristics being examined. At the conclusion of the perceptual listening task, participants were asked to complete a brief demographic survey. All responses for a participant were recorded using a single Qualtrics (Qualtrics, Provo, UT) survey. After completing the perceptual component of the study, participants were asked to sign a Research Participant Disclosure Form (Appendix H) and were given ten dollars in cash as compensation for their time and effort in completing the study. Funding for this study was provided by the College of Liberal Arts Promise Award Fund.

4. RESULTS

In total, forty-two participants of the expected fifty were recruited to participate in the study. Of the forty-two, two participants' responses were excluded from analysis. One participant was not an L1 speaker of a Midwestern dialect of American English and the other accidentally skipped over one of the recorded paragraphs in the perceptual portion of the experiment, rendering the responses invalid. This left a total of forty participants; twenty in each group. The eight male participants and thirty-two female participants were divided evenly across the groups so that each group included four males and sixteen females. At the conclusion of the experiment, the data for each participant was examined closely. Each participant's responses were matched with the speaker for which they were recorded. This was done by cross-referencing the Praat (Boersma & Weenink 2016) output for each participant, which provided the randomized order of the speaker audio files, with the response values recorded through Qualtrics (Qualtrics, Provo, UT). All data was compiled into an Excel spread sheet that broke down the data into participant number, characteristic, response value (-3 to 3), speaker, status of the alveolar stop (pronounced or deleted), speaker gender (male or female), and group. Paragraphs in which word-final alveolar stops were pronounced were coded as "1" while paragraphs in which word-final alveolar stops had been removed were coded as "0". SPSS software was then used to run the statistical analysis.

Prior to the commencement of the experiment and throughout the data analysis, the researcher met with a consultant from the Purdue Statistical Consulting Service to determine the best approach for analyzing the collected experimental data. A linear mixed model was proposed whereby the Rating = Group + Subject(Group) + Gender + Treatment + Gender*Treatment + Residual. Participants (i.e. Subject (Group)) were considered random effects whereas group, speaker gender (male or

female), treatment (presence or absence of t/d), and the interaction between speaker gender and treatment were considered fixed effects. The following sections discuss the results from the statistical analysis of the experimental data.

4.1 Data & Statistics

Participants rated their initial reactions to speakers regarding thirteen different characteristics. Of the thirteen characteristics, only four do not have a single statistically significant result for either of the factors (word-final alveolar stop deletion and gender) or an interaction between the two factors. The four characteristics that show unremarkable results are *friendly/unfriendly*, *hardworking/lazy*, *successful/unsuccessful*, and *young/old*. Results for the remaining nine characteristics are much more interesting and are discussed in detail below.

A single characteristic, *intelligent/unintelligent*, has statistically significant findings for both factors as well as for the interaction between the two factors. According to the model used, deletion of word-final alveolar stops and speaker gender has a statistically significant effect on participant response values. Table 4.1 shows the output from the statistical analysis of the data. Relevant information has been circled.

Table 4.1.
SPSS Output for *intelligent/unintelligent*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	1.178125	.175900	89.245	6.698	.000	.828629	1.527621
[td=0]	-.400000	.172668	277	-2.317	.021	-.739908	-.060092
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	-.462500	.172668	277	-2.679	.008	-.802408	-.122592
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	-.031250	.198799	38	-.157	.876	-.433697	.371197
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	.787500	.244189	277	3.225	.001	.306798	1.268202
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

Word-final alveolar stop deletion has two levels: pronounced (t/d=1) and deleted (t/d=0). SPSS used the level pronounced (i.e. not deleted) as the baseline. Deletion results in a mean response value that is lower, in a statistically significant way, than the mean response value for no deletion (Sig. = .021). *Intelligent* is considered the more positive endpoint while *unintelligent* is considered the more negative endpoint on the semantic differential scale. The table above shows that the mean response value for speakers who delete is lower than for speakers who do not delete. This indicates that deletion results in speakers being rated as less intelligent. This suggests that speakers exhibiting deletion are rated (overall) as less intelligent than those who do not exhibit deletion. This finding aligns with the results from the pilot study for this experiment.

Gender also has two levels: male (m) and female (f). SPSS used *male* as the baseline. Female speakers have a mean response value that is lower, in a statistically significant way, than the mean response value for male speakers (Sig. = .008). This indicates that female speakers, on average, are rated lower regarding intelligence than their male counterparts. This finding is interesting because of its possible implications. Perhaps this indicates that people believe that men are simply more intelligent than women. If women are considered less intelligent in general, this could have interesting ramifications on the current debate concerning the gender gap. The most thought-provoking thing about this finding is that the overwhelming majority of participants (80%) were female. This finding raises a couple of questions: are members of a gender more critical of members of the same gender or does this reflect a larger societal bias? More research would need to be conducted to identify whether these results are replicable and if so, what this information says on a larger scale about the differences in attitudes toward the perceived abilities of men and women.

Gender and alveolar stop deletion show a significant interaction for this characteristic as well (Sig. = .001). Upon closer inspection of this statistically significant result, it can be observed that deletion has similar effects on both genders' perceived intelligence but in opposite directions. Fig. 4.1 provides a graphical representation of

the interaction. While men who do not delete alveolar stops are perceived as more intelligent than those who do delete them, women who do not delete alveolar stops are perceived as less intelligent than those who do delete them. Men who do not exhibit deletion are perceived as more intelligent than women who also do not exhibit deletion. Interestingly, though, women who delete are perceived as more intelligent than men who also delete. This is a somewhat strange and unexpected result. Because both word-final alveolar stop deletion and women were found to be associated with lower ratings of intelligence, it seems unusual to only see a reversal in the trend when women are the ones exhibiting deletion. One would expect women who delete these stops to be rated significantly less intelligent than men who delete, but the opposite seems to be true of this data. This result does seem to support the first part of the fourth experimental hypothesis though, which states that women will be rated neutrally or more favorably in instances where deletion occurs.

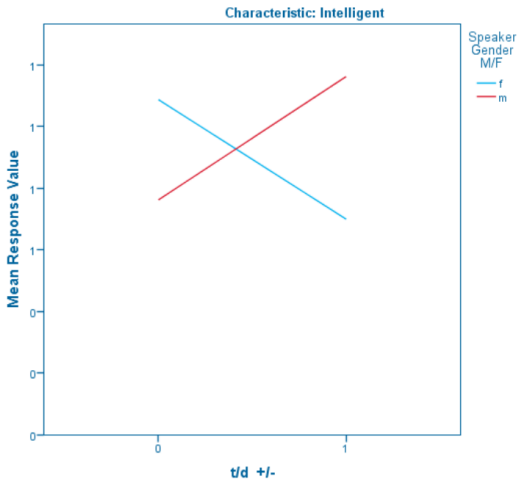

Figure 4.1. Effects of interaction between speaker gender and t/d deletion for *intelligent/unintelligent*

Two additional characteristics show statistically significant results for the effect of word-final alveolar stop deletion on the mean response value as well as an interaction between gender and deletion. A third characteristic, *wealthy/poor*, shows significant

results for deletion and some interesting, though not significant, results for the interaction between the two factors. The first of these characteristics is *formal/casual*. In terms of the semantic differential scale, *formal* represents the positive endpoint while *casual* represents the negative endpoint. Table 4.2 displays the output from SPSS for the statistical analysis of the data for *formal/casual*. Relevant information has been circled.

Table 4.2.
SPSS Output for *formal/casual*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	.303125	.207538	315	1.461	.145	-.105211	.711461
[td=0]	-.775000	.262517	315	-2.952	.003	-1.291509	-.258491
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	-.012500	.262517	315	-.048	.962	-.529009	.504009
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	.143750	.185628	315	.774	.439	-.221477	.508977
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	.737500	.371256	315	1.987	.048	.007046	1.467954
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

Deletion of alveolar stops resulted in a mean response value that is lower, in a statistically significant way (Sig. = .003), than the mean response value for no deletion. This indicates that speakers who delete target word alveolar stops are, on average, rated as less formal than those who do not delete these stops. These results are not all that surprising. People often use more carefully articulated speech when in a more formal environment than they do in a more casual environment. A person who is hanging out with a bunch of close friends will generally speak more casually than a person who is engaged in a job interview with several people in senior positions. This result suggests that alveolar stop deletion may also be a variable used to convey speech style.

Though speaker gender alone does not yield significant results, deletion and speaker gender show a significant interaction (Sig. = .048) for the characteristic *formal/casual*. Fig. 4.2 shows the effects of the interaction between these two factors on response values for *formal/casual*. Closer examination of the interaction between the two factors indicates that deletion of word-final alveolar stops appears to have a larger impact for men than it does for women in terms of perceived formality. There is a larger difference in response values between men than between women regarding whether deletion occurs or not. The mean rating for men who delete alveolar stops is lower than for men who do not. The difference in mean values between women is less distinct. Interestingly, men who delete alveolar stops are also rated as more casual than women who delete. This result appears to lend support to the fourth experimental hypothesis. This hypothesis states that female speakers will be rated neutrally or more favorably than male speakers when deletion occurs. When deletion does not occur, formality is perceived similarly between both genders.

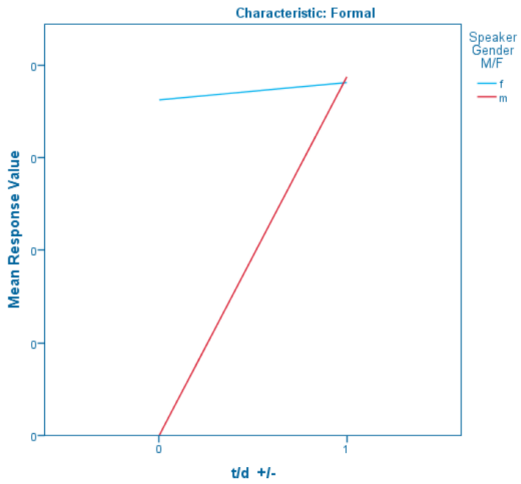

Figure 4.2. Effects of interaction between speaker gender and t/d deletion for *formal/casual*

The next characteristic that has significant results for both word-final alveolar stop deletion as well as the interaction between gender and alveolar stop deletion is *laid-back/uptight*. The positive endpoint of the semantic differential scale is *laid-back*, while the negative endpoint of the scale is *uptight*. Table 4.3 contains the output for the statistical analysis of the data for *laid-back/uptight*. Important information has been identified with a circle.

Table 4.3.
SPSS Output for *laid-back/uptight*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	-.125000	.214850	132.714	-.582	.562	-.549973	.299973
[td=0]	.812500	.247503	277.000	3.283	.001	.325274	1.299726
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	-.112500	.247503	277.000	-.455	.650	-.599726	.374726
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	-.250000	.215354	38.000	-1.161	.253	-.685962	.185962
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	-.875000	.350023	277.000	-2.500	.013	-1.564042	-.185958
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

The mean response values for *laid-back/uptight* are higher in a statistically significant way (Sig. = .001) for speakers who exhibit alveolar stop deletion than for those who do not. This suggests that listeners, on average, rated the speakers who delete as more laid-back than those who do not delete. This result aligns nicely with those from the stylistic characteristic *formal/casual*. One would anticipate that these two traits would run parallel to one another. One is more stylistic while the other is more of a personal characteristic, but they are like two different sides of the same coin. Speaking formally might make a person seem more uptight whereas speaking more casually might make someone appear more laid-back or relaxed. This overlap may help explain why the two characteristics produce such similar results.

Gender by itself does not have significant results for *laid-back/uptight*. However, speaker gender and t/d deletion show a statistically significant interaction (Sig. = .013). Fig. 4.3 shows the effects of the interaction between speaker gender and t/d deletion on response values for *laid-back/uptight*. Just like with *formal/casual*, t/d deletion has a larger effect on mean response values for male speakers than for females speakers regarding how laid-back or uptight they are perceived. Male speakers are perceived as more laid-back when they delete word-final alveolar stops than when they do not. Male speakers who delete are also perceived as more laid-back than female speakers who delete. Female speakers are perceived as more uptight than their male counterparts whether deletion occurs or not. This finding runs counter to both the first part of the fourth experimental hypothesis as well as to the results for *formal/casual*. It was posited that female speakers would be rated neutrally or more favorably when deletion occurs, however this set of results seems to contradict this hypothesis.

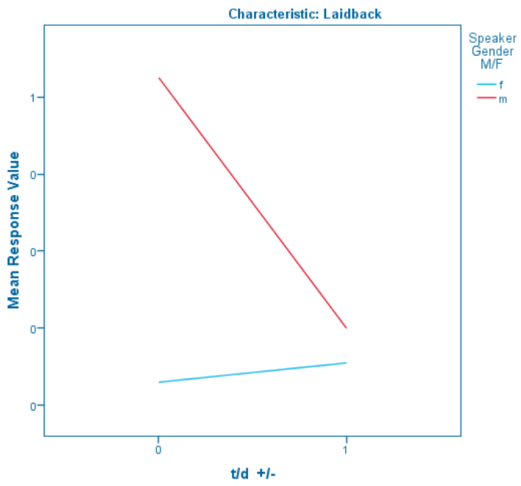

Figure 4.3. Effects of interaction between speaker gender and t/d deletion for *laid-back/uptight*

An important thing to note is that the significant results concerning the effect of word-final t/d deletion for these characteristics, appear to support the first two research hypotheses. Word-final alveolar stop deletion does appear to be an important

source of variation within a speech signal and it does seem to be a feature of speech that is used to form initial judgments about a speakers personal characteristics or personality traits.

The last characteristic to have significant results for word-final alveolar stop deletion is *wealthy/poor*. *Wealthy* represents the positive end of the semantic differential scale while *poor* represents the negative end of the scale. Table 4.4 provides the SPSS output for the analysis of the characteristic *wealthy/poor*. Relevant information has been circled.

Table 4.4.
SPSS Output for *wealthy/poor*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	.478125	.131660	171.725	3.632	.000	.218244	.738006
[td=0]	-.350000	.164002	277.000	-2.134	.034	-.672849	-.027151
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	-.262500	.164002	277.000	-1.601	.111	-.585349	.060349
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	.143750	.120401	38	1.194	.240	-.099988	.387488
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	.437500	.231934	277.000	1.886	.060	-.019077	.894077
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

The effect of word-final alveolar stop deletion on mean response values is statistically significant (Sig. = .034). Speakers who exhibit t/d deletion receive a mean response value that is lower than those who do not exhibit deletion. This indicates that speakers who delete word-final alveolar stops are perceived as being less wealthy than those who pronounce them.

Though not statistically significant, an interesting interaction also occurs between deletion of alveolar stops and speaker gender (Sig. = .060). Fig. 4.4 shows the effects of the interaction between speaker gender and t/d deletion on response values for *wealthy/poor*. Deletion appears to have a greater effect on perceived wealth for

males than for females. Male speakers who delete are perceived as less wealthy than those who do not delete. Female speakers who delete are perceived as only slightly wealthier than those who do not delete. Male speakers who pronounce the alveolar stops are also perceived as somewhat wealthier than their female counterparts who also pronounce the alveolar stops. These results lend support to the first part of the fourth experimental hypothesis but seem to contradict the second part of the hypothesis. When deletion occurs, women are perceived more favorably than men, but when deletion does not occur, men are perceived somewhat more favorably than women.

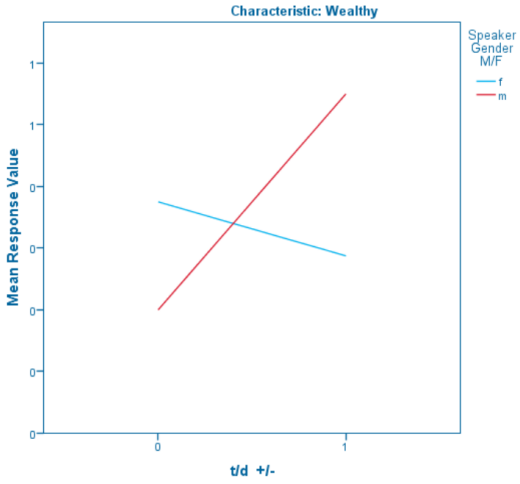

Figure 4.4. Effects of interaction between speaker gender and t/d deletion for *wealthy/poor*

The analyses of two characteristics, *polite/impolite and sincere/insincere*, reveal a significant effect of speaker gender on participant responses. A third characteristic, *kind/unkind*, has interesting, though non-significant results for speaker gender. The first of these characteristics is *polite/impolite* (Sig. = .024). The semantic differential scale has *impolite* as the more negative endpoint and *polite* as the more positive endpoint. Table 4.5 gives the SPSS output for this characteristic. Important values have been circled.

Table 4.5.
SPSS Output for *polite/impolite*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	.781250	.176374	114.672	4.430	.000	.431876	1.130624
[td=0]	.087500	.192966	277.000	.453	.651	-.292367	.467367
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	.437500	.192966	277.000	2.267	.024	.057633	.817367
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	-.112500	.185172	38	-.608	.547	-.487361	.262361
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	.050000	.272896	277.000	.183	.855	-.487213	.587213
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

As Table 4.5 shows, the effect of speaker gender on ratings of perceived politeness is significant. The mean response value is higher (in a statistically significant way) for female speakers than it is for male speakers. This suggests that participants perceive female speakers as more polite than their male counterparts. Word-final alveolar stop deletion has no significant effect on perceived politeness and there is no significant interaction between the two factors.

Speakers' perceived sincerity is also affected by speaker gender. *Sincere* is the positive endpoint on the semantic differential scale and *insincere* the negative endpoint. Table 4.6 shows the SPSS output for the statistical analysis of the characteristic *sincere/insincere*. Circled information is relevant to the discussion.

These results show that speaker gender has a significant effect on participant responses regarding perceived sincerity. Female speakers are rated higher than male speakers. This indicates that, in general, female speakers are perceived as more sincere than male speakers. Word-final alveolar stop deletion does not significantly affect participants judgments about the sincerity of a speaker. There is also no significant interaction between the gender of a speaker and deletion.

Table 4.6.
SPSS Output for *sincere/insincere*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	.209375	.214147	103.349	.978	.330	-.215317	.634067
[td=0]	.125000	.224808	277	.556	.579	-.317548	.567548
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	.475000	.224808	277	2.113	.036	.032452	.917548
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	-.068750	.231978	38	-.296	.769	-.538365	.400865
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	.012500	.317926	277	.039	.969	-.613358	.638358
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

A third characteristic, *kind/unkind*, although it does not have statistically significant results for speaker gender, is nevertheless interesting in its similarity to the two characteristics for which speaker gender is significant. Table 4.7 provides the SPSS output for *kind/unkind*. Relevant information has been circled.

Kind is the more positive endpoint on the semantic differential scale while *unkind* is the more negative endpoint. The data shows that gender does not have a statistically significant effect (Sig. = .072) on participants' mean response values for perceived kindness, but the trend in the data is interesting when viewed together with the results for *polite/impolite* and *sincere/insincere*. Once again, female speakers are rated more favorably than male speakers for each of these characteristics. Participants perceive female speakers as being kinder than male speakers (though not in a statistically significant way). Deletion of alveolar stops has no significant impact on the perceived kindness of speakers. There is also no significant interaction between t/d deletion and speaker gender.

Table 4.7.
SPSS Output for *kind/unkind*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	.559375	.172125	154.328	3.250	.001	.219349	.899401
[td=0]	.012500	.207892	277	.060	.952	-.396748	.421748
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	.375000	.207892	277	1.804	.072	-.034248	.784248
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	-.068750	.163829	38.000	-.420	.677	-.400405	.262905
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	.037500	.294003	277	.128	.899	-.541264	.616264
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

The final two characteristics that this study seeks to examine are *dependable/undependable* and *educated/uneducated*. The first of these shows a significant interaction between deletion of word-final alveolar stops and speaker gender on participant perception of the characteristic. The second of these, though not statistically significant, has interesting results when viewed in conjunction with the results for *intelligent/unintelligent*: both exhibit similar trends in their data. Neither deletion nor gender independently affect participant responses for either *dependable/undependable* or *educated/uneducated*. Table 4.8 provides the SPSS output for *dependable/undependable*. Relevant information has been circled.

Table 4.8.
SPSS Output for *dependable/undependable*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	.859375	.192784	86.668	4.458	.000	.476176	1.242574
[td=0]	-.262500	.186434	277	-1.408	.160	-.629508	.104508
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	-.137500	.186434	277	-.738	.461	-.504508	.229508
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	.106250	.219688	38	.484	.631	-.338485	.550985
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	.637500	.263658	277	2.418	.016	.118472	1.156528
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

Upon further investigation of the significant interaction between deletion and speaker gender (Sig. = .016), it can be determined that deletion has a slightly larger effect on ratings for female speakers than male speakers. Fig. 4.5 shows the effects of the interaction between speaker gender and t/d deletion on response values for *dependable/undependable*. Male speakers who delete are perceived as less dependable than male speakers who do not delete. Female speakers show the opposite pattern. Female speakers who delete are perceived as more dependable than female speakers who do not delete. When male and female speakers are examined regarding deletion, female speakers' ratings are more favorable than male speakers' ratings. When no deletion occurs, female speakers are rated somewhat less favorably than males. These results seem to support the first part of the fourth experimental hypothesis while undermining the second part of it.

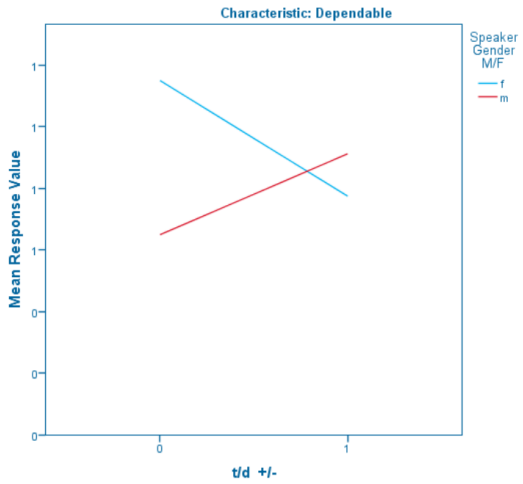

Figure 4.5. Effects of interaction between speaker gender and t/d deletion for *dependable/undependable*

Table 4.9 provides the SPSS output for the analysis of the thirteenth and final characteristic: *educated/uneducated*. *Educated* is the positive endpoint of the semantic differential scale while *uneducated* is the negative endpoint of the scale. Important information has been circled.

Table 4.9.
SPSS Output for *educated/uneducated*

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	1.059375	.178436	96.867	5.937	.000	.705222	1.413528
[td=0]	-.287500	.182112	277	-1.579	.116	-.645999	.070999
[td=1]	0[b]	0	.	.	.	.	.
[SpeakerGenderMF=f]	-.237500	.182112	277	-1.304	.193	-.595999	.120999
[SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[Group=1]	-.018750	.196991	38.000	-.095	.925	-.417538	.380038
[Group=2]	0[b]	0	.	.	.	.	.
[td=0] * [SpeakerGenderMF=f]	.487500	.257545	277	1.893	.059	-.019494	.994494
[td=0] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=f]	0[b]	0	.	.	.	.	.
[td=1] * [SpeakerGenderMF=m]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Response Value.

b. This parameter is set to zero because it is redundant.

This table shows a non-significant interaction (Sig. = .059) between t/d deletion and speaker gender on perceived level of education. Though non-significant, these results are interesting when compared with those for *intelligent/unintelligent*. Fig. 4.6 shows the (non-significant) effects of the interaction between speaker gender and t/d deletion on response values for *educated/uneducated*. Deletion of word-final alveolar stops seems to have similar effects for each gender however these effects seem to go in the opposite directions. Male speakers who delete are perceived as less educated than female speakers who delete while female speakers who do not delete are perceived as less educated than male speakers who do not delete. Female speakers are rated more favorably than males when deletion occurs but are rated less favorably than males when deletion does not occur. Interestingly, the results for *educated/uneducated* seem to run parallel to the results for *intelligent/unintelligent*. The same patterns occur for both characteristics when the results for the interactions are examined. This seems reasonable as many people associate level of education with level of intelligence just as they might conflate greater formality with being more uptight.

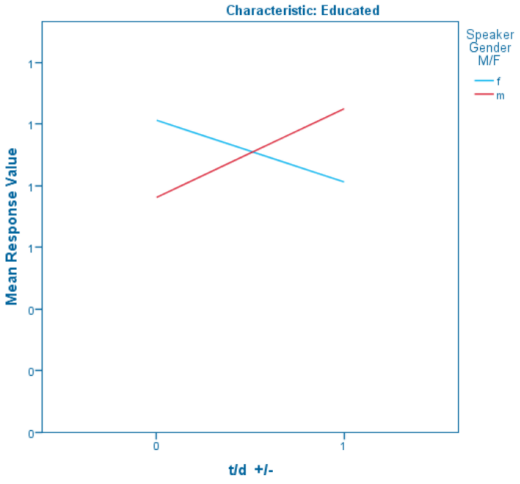

Figure 4.6. Effects of interaction between speaker gender and t/d deletion for *educated/uneducated*

4.2 Discussion

Though the data collected from this experiment yielded several significant results, one that stands out most starkly relates to the group of characteristics that show word-final alveolar stop deletion as having a significant effect on mean response values. These four characteristics are *intelligent/unintelligent*, *formal/casual*, *wealthy/poor*, and *laid-back/uptight*. Each of these traits, with the exception of *laid-back/uptight*, belongs to the group more closely associated with *competency*. The third experimental hypothesis posits that traits belonging to the *competency* group will be rated more favorably when deletion does not occur than when it does. As the statistical results show, participants rated speakers who do not delete word-final alveolar stops higher than they rated speakers who do delete. Deletion resulted in less favorable mean response values for these traits. *Laid-back/uptight* belongs to the group of traits more closely aligned with *likability*. The third experimental hypothesis also predicts that traits belonging to this group will be rated more favorably when deletion of word-final alveolar stops does occur. Of the four traits that have statistically significant effects for t/d deletion, this is the only one that provides results showing deletion having a more positive effect than non-deletion on the mean response value. This group of characteristics provides excellent support for the third experimental hypothesis.

One noteworthy aspect of these results is that the majority of traits having significant findings for word-final alveolar stop deletion belong to the *competency* category. Only a single trait, *laid-back/uptight*, belongs to the *likability* category, and *laid-back/uptight* could be interpreted as being similar to *formal/casual*. Whereas *formal/casual* is more closely tied to speech style, *laid-back/uptight* better describes an aspect of an individual's personality. It seems plausible to hypothesize that a person considered more uptight and less relaxed might also focus more on careful speech and thus speak in a more formal manner than would a person considered more laid-back. Of all the traits in the *likability* category, *laid-back/uptight* is the one most closely

associated with a trait belonging to the *competency* category. The question, then, is why does alveolar stop deletion affect *competency* traits more than *likability* traits?

A possible explanation for the disparity in significant results between the two groups is that people associate *competency* traits with more formal and less personal environments, such as academic or professional settings. In these types of environments, performance is highly valued and clear, carefully articulated speech is an asset. A greater number of word-final alveolar stops will be produced in more careful speech than in more casual and rapid speech. Therefore, listeners can use the presence of a greater number of word-final alveolar stops to identify more formal, careful speech which appears linked more closely with traits related to a speaker's *competency*. Based on the results from this study, it seems that listeners do notice the presence of word-final alveolar stops and use this to form judgments about a speaker, especially as it concerns traits of *competency*.

Interestingly, t/d deletion does not significantly affect listener perceptions of education levels. A person's intelligence and level of education are often conflated so it is surprising to have significant results for *intelligent/unintelligent*, but not for *educated/uneducated*. The setting for this experiment is a college campus, so one explanation is that participants might have assumed speakers were members of the same academic community and would all have similar levels of education.

Labov (1973:237) describes a sociolinguistic variable as "... one which is correlated with some nonlinguistic variable of the social context...". Participants rated speakers who delete differently than those who do not delete, which indicates that this variable is associated with some nonlinguistic information. The question, then, is whether this variable is something that speakers are actively aware of or if it is something that informs their judgment in a subtler, less noticeable way. Labov (1973:237-251) proposes three levels of sociolinguistic variables *stereotype*, *marker*, and *indicator*. The most easily recognizable level is that of *stereotype*. Linguistic *stereotypes* are a feature of language that people are very aware of or that "rise to social consciousness" (Labov 1973:248). Meyerhoff (2006:22) explains that *stereotypes* usually inspire strong re-

actions and are often the features used when imitating another dialect because they are accessible. Speakers are not overtly aware of *markers*. They exist below the level of consciousness and exhibit differences in stylistic use (Meyerhoff 2006:23 and Labov 1973:237). People are not aware of *indicators* but they often can be used to distinguish one group from another based on their occurrence in speech (Meyerhoff 2006:23).

In analyzing the results from this study, it raises the question of where word-final alveolar stop deletion falls along this continuum. *Stereotype* can effectively be eliminated based on the demographic survey results in which not a single participant was able to identify the subject of the experiment. This indicates that participants do not overtly recognize this variable in the speech of others. The results do show that listeners use this variable in forming judgments about a speaker. They are at least subconsciously aware of this variable, which eliminates it as an *indicator*. It seems clear that word-final alveolar stop deletion is a *marker*. People use it in forming judgments about a speaker but do not consciously recognize it in speech. The results also indicate that this variable is associated with the stylistic feature *formal/casual*. Speakers who delete are rated more casually than speakers who do not delete. The results support the conclusion that this sociolinguistic variable is a linguistic *marker*.

A second set of results that stands out from the rest are the characteristics that show a significant effect for only speaker gender. These characteristics are *polite/impolite* and *sincere/insincere*. A third trait, *kind/unkind*, though not statistically significant, exhibits trends in its data that align with the other two traits. All three of these characteristics fall firmly into the group more closely associated with *likability*. It could be argued that these characteristics are those that would be described as most aligned with a nurturing personality. The results for each of these traits indicate that female speakers receive more favorable ratings than do male speakers. Whereas women are often described as nurturers, men are often described as providers or, more generally, in terms of their competency. Men and women are frequently described using a different set of traits. Only a single characteristic

that shows a significant effect for gender belongs to the *competency* group: *intelligent/unintelligent*. The analysis shows that women are rated much less favorably than men regarding perceived intelligence. The majority of participants in this study were female, however. Whereas t/d deletion has significant effects mainly on traits in the *competency* group, gender has significant effects mainly on traits in the *likability* group. It would be an interesting undertaking to try to identify why participants (especially female participants) consistently rate female speakers as more polite, kind, and sincere but less intelligent than their male counterparts. Is this the result of some in-group mentality, some sort of social preconditioning, some random variation in the data, or some combination of these? More work would need to be done to come to any sort of a conclusion about these results.

The interactions between speaker gender and t/d deletion also provide some food for thought. Female speakers exhibiting deletion receive more favorable ratings than male speakers with the same deletion for three out of the four characteristics that show significant results (*intelligent/unintelligent*, *formal/casual*, and *dependable/undependable*. The two traits with non-significant but interesting results also show this same pattern of females who delete being rated more favorably than males who delete. This provides support for the first part of the fourth hypothesis which predicts that when deletion occurs, females will be rated neutrally or more favorably than males. As mentioned previously, in their research on vowel monophthongization, Plichta and Preston (2005:121) found that female speakers were identified as being from locations further north than male speakers who exhibited the same amount of monophthongization. They explain that people believe women use more standard speech than men and that their results reflect an inability or unwillingness to identify women as belonging to a "more stigmatized" (Plichta & Preston 2005:123) part of the country. It is possible to extrapolate this theory to account for the differences between ratings for men and women who exhibit the same patterns of deletion. Perhaps participants in this study are unable to reconcile a less standard variant of speech with the female speakers producing it.

A second and slightly more puzzling result is found in the breakdown of the factor interactions. The patterns for male speakers who delete and those who do not delete align with the predictions laid out in the third experimental hypothesis. Characteristics belonging to the *competency* group have more favorable ratings when deletion does not occur. Characteristics belonging to the *likability* group have more favorable ratings when deletion does occur. However, in examining the breakdown of the interaction for female speakers, the results are the exact opposite of what has been predicted. The characteristics that have a significant interaction, with the exception of *formal/casual*, all show that characteristics belonging to the *competency* group have more favorable ratings when deletion does occur. Characteristics belonging to the *likability* group have more favorable ratings when deletion does not occur. A possible explanation for this might be that participants expect female speakers to produce more standard speech and when the actual speech does not align with the expectations, the resulting responses thus do not align with the anticipated responses. Further investigation into this unusual result needs to occur before any conclusions may be drawn about these interactions to ensure it is not just an unpredictable quirk in the collected data.

4.2.1 Potential Issues

A statistical consultant from the Purdue Statistical Consulting Service was involved in the design of the statistical model, the running of the statistical analysis, and the interpretation of the statistical results. While analyzing the results, there was some uncertainty surrounding which part of the SPSS output would be most reliable to use for reporting results from this experiment. Following the advice of the statistical consultant provided, results were extracted from the "Estimates of Fixed Effects" output table (t-tests). These are the results that have been discussed and recorded above. After completion of both the written thesis and oral thesis defense, the statistical consultant acknowledged that the "Type III Test for Fixed Effects" output

table (f-tests) was actually the more reliable choice. It is possible that running a different type of test could call into question some of the results reported above. The results that appear to be most affected by using a different test are gender and deletion for *intelligent/unintelligent* and deletion for *wealthy/poor*. In both cases, these factors become non-significant. A few characteristics that had non-significant results for a factor become significant though. The trait *laid-back/uptight* shows significant results for speaker gender. Another characteristic, *kind/unkind*, which showed interesting but non-significant results for gender appears significant when the alternate test is run. The rest of the results appear unchanged. Resolving these potential issues is a problem for future research.

4.3 Reflections

Running an experiment helps identify weaknesses in the design and procedure. No amount of planning can make one anticipate every problem before it occurs. Though this study progressed fairly smoothly, there are a few things that could be changed or improved if it were to be replicated in the future. The first major adjustment that could be made in the future would to be to clearly indicate to participants that they need to listen to the entire recording before logging any responses. This study involves very subtle variation that occurs throughout the entire stimulus paragraph. Occasionally, participants were observed recording responses for a characteristic nearly immediately upon hearing a speaker's voice rather than waiting to hear the entire passage. More detailed instructions for participants would help alleviate this issue entirely.

Another variable could also have been added to this study in order to gain a more complete picture of how initial perceptions of a speaker are formed. Speaker gender is included in the model, but participant gender is not. Participant gender was not included due to the unbalanced nature of the subject pool. A large majority of participants were female, so getting accurate results about participant gender with

so few male participants would have been nearly impossible. Finding a way to achieve a more gender-balanced group of participants would help resolve this issue.

5. CONCLUSION

The primary goal of this experiment is to examine word-final alveolar stop deletion from a perceptual standpoint and to answer a series of research questions about this variable. A series of five research hypotheses were developed. Upon analysis of the collected data, four of these hypotheses are supported or contradicted by the findings. The first and second hypotheses are both supported by the data analysis. Word-final alveolar stop deletion does appear to be a sociolinguistic variable that participants are aware of, though not consciously. In the participant demographic survey, participants were asked to describe what the experiment was about. Not a single participant identified t/d deletion as the subject of the study. The presence or absence of word-final alveolar stops, does affect the mean response value in a statistically significant way for four characteristics. It is proposed that this variable is a linguistic *marker* because it is sociologically meaningful to participants and they utilize it in forming initial opinions about a speaker even though they are not overtly aware of it in the speech of others.

The results indicate that participants in this study made use of word-final t/d deletion in forming their initial opinions about speakers' personality traits and characteristics. This helps support the third experimental hypothesis which posits that listeners do utilize word-final alveolar stop deletion when making judgments about a speaker's personal characteristics. Several traits more closely associated with a person's *competency* do reflect more favorable ratings when deletion does not occur, as predicted. No trait associated with *competency* has a significantly more favorable rating when deletion occurs. One trait more closely linked to a person's *likability* does show more favorable ratings when deletion occurs, as predicted. No trait associated with *likability* has a significantly more favorable rating when deletion does not occur.

The fourth hypothesis is related to the interaction between gender and deletion. The hypothesis predicts that when deletion does occur, female speakers will be rated more favorably than male speakers. It also predicts that when deletion does not occur, that there will be little to no difference between the ratings for the two genders. Three of the four characteristics that have significant results for the interaction between gender and deletion provide support for the first part of the hypothesis. Two additional characteristics that have interesting but non-significant results for deletion of word-final alveolar stops, *wealthy/poor* and *educated/uneducated*, both pattern with the results for the three characteristics that are significant for this factor. Only *laid-back/uptight* shows male speakers being rated more favorably than female speakers when deletion occurs. The other five characteristics show female speakers being rated more favorably in the presence of deletion than male speakers. The second part of the hypothesis is unanimously contradicted by the results. All four traits that have a significant interaction show female speakers are rated somewhat more unfavorably than male speakers when deletion does not occur. The fifth and final hypothesis is meant to analyze the interaction (if any) between a participant's pattern of production and their pattern of rating speakers. Though production data was collected, due to time constraints, this data has not yet been reviewed and analyzed.

Looking at the data in terms of the research questions and hypotheses, it appears that word-final alveolar stop deletion may in fact be a feature of speech that listeners use in forming initial judgments about a speaker. This information provides a number of possibilities for future research. One of the main goals of future research is to analyze the production data that was collected during this experiment and to identify whether there are any connections between the individual speech patterns of a listener and the ratings they assign to speakers with similar or dissimilar patterns of production. Though there is a growing body of work examining the link between production and perception, more needs to be done to tease apart this tangled and intricate relationship.

Speaker gender significantly affected how listeners perceived several characteristics of speakers. A number of characteristics also exhibited a significant interaction between speaker gender and word-final alveolar stop deletion. Participant gender should be added to the model to identify if there is any significant interaction between speaker and participant genders regarding the formation of initial opinions of or attitudes toward speakers. In order to incorporate this additional variable into the experiment, a more gender-balanced group of participants would need to be recruited. Including this variable in the design might help shed light on some of the more interesting interactions that appeared between gender and t/d deletion.

A number of previously mentioned studies utilized participant priming techniques in their designs. An interesting addition to the design of this study would be to prime participants with information about speakers to see how the information interacts with t/d deletion in the formation of initial judgments. The results from this experiment show that speakers who exhibit deletion are regarded as less intelligent, formal, and wealthy than speakers who do not exhibit deletion. Providing background information about a speaker that does not align with the results mentioned above (e.g. a man driving a fancy car paired with a speaker who employs deletion) might indicate how salient alveolar stop deletion is for listeners and how strongly it influences the formation of initial judgments.

The results from this study may be viewed as a small first step towards addressing the gap in the literature concerning listener perception of word-final alveolar stop deletion. Though further research (as detailed above) needs to be completed to replicate and expand upon the results, these findings represent an initial attempt at answering the questions of if and how word-final alveolar stop deletion influences initial opinions of a speaker's personal characteristics.

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APPENDICES

A. INFORMED CONSENT

RESEARCH PARTICIPANT CONSENT FORM

Listener Perception of and Attitudes toward Sociophonetic Variation

Dr. Mary Niepokuj
Department of Interdisciplinary Studies & Linguistics Program
Purdue University.

What is the purpose of this study?

The purpose of this study is to examine and better understand what cues in speech listeners use to form initial opinions about the personal characteristics of unknown speakers. You have been asked to participate because you meet the language background requirements for this study. We plan to enroll 50 participants in this study.

What will I do if I choose to be in this study?

Participation in this study involves the completion of two different experimental tasks. You will complete all tasks in a quiet room in the Phonetics and Phonology Lab in Heavilon Hall (B2A). If you choose to withdraw from this study at any time, data collected up to that point will be retained for statistical reasons and you will be paid for the duration of your participation at a rate of $5 per 30 minutes. You may ask questions before, after, or during pauses in the experimental tasks.

Experimental Task 1:
You will be provided with a short instructional paragraph and adequate time to familiarize yourself with it. When you feel comfortable with the paragraph you will be asked to read it aloud three times in a row at a pace that feels comfortable and natural to you. Your voice will be recorded digitally while you read the paragraph aloud.

Experimental Task 2:
You will be asked to listen to eight speakers reading a short instructional paragraph. You will be supplied with high-quality headphones to facilitate listening. After each paragraph is read, you will be asked to rate the speaker regarding 13 personal characteristics using a scale provided to you. These ratings are based on your initial reaction to the speech you have just heard. There is no right or wrong answer. You will record all responses digitally through a Qualtrics survey.

Background Information:
After you have completed both experimental tasks, you will be asked to complete a brief background survey. The survey will include questions about demographics, language exposure, and linguistic experience, all of which are topics that may influence performance in the study. You will record all responses digitally through a Qualtrics survey.

What are the possible risks or discomforts?

Participation in this study involves a level of risk that is no greater than that experienced during daily life. Because no security system is perfect, there is always a possibility of breach of confidentiality with respect to collected data. Safeguards to minimize this risk are discussed in the Confidentiality section of this form.

Are there any potential benefits?

You will not receive any direct benefit by participating in this study. Your participation in this study, however, may contribute to a better understanding of speech perception and attitudes towards variation in language.

Will I receive payment or other incentive?

You will be compensated $10 upon the completion of your participation in this study. If you choose to withdraw before completing both experimental tasks, you will be compensated at a rate of $5 per 30 minutes. Total compensation will not exceed $10.

Will information about me and my participation be kept confidential?

The identity of all participants in this study will remain confidential. All records and any publications concerning this research will contain only randomly assigned participant identification numbers. Records of individual participation in the experiment will be maintained for payment purposes, but these will not be linked in any way to participant identification numbers. When publishing the results of this study, all data will be reported in a summarized format combining data from all participants (as group means); no individual data are expected to be reported. Should individual data need to be reported for scientific purposes, individual participants will only be identified by their randomly assigned participant identification numbers. All data collected will be kept on file for the life of the storage media, and may be used for future research. Digital data will be stored on a password-protected computer or server and paper records will be stored in a file cabinet in the laboratory, which remains locked, and is accessible only by members of the research team. Upon disposal, digital data files will be permanently erased from the hard-drive or server and paper records will be shredded. The project's research records may be reviewed by departments at Purdue University responsible for regulatory and research oversight.

In order to process cash payments, the Business Office of the Linguistics Program (SIS) requires a receipt of payment form that includes not only the IRB Protocol Number and name of the experiment and experimenter but also the printed name and signature of the participant.

Therefore, your name, but not any of the collected data, may be seen in connection with participation in this experiment by personnel in the business office.

What are my rights if I take part in this study?

Your participation in this study is completely voluntary. You may choose not to participate or, if you agree to participate, you can withdraw your participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Who can I contact if I have questions about the study?

If you have questions, comments or concerns about this research project, you can talk to one of the researchers. Please contact Dr. Mary Niepokuj, niepokuj@purdue.edu, (765) 494-6512 or Emily Dick, dick8@purdue.edu. If you have questions about your rights while taking part in the study or have concerns about the treatment of research participants, please call the Human Research Protection Program at (765) 494-5942, email (irb@purdue.edu) or write to:

Human Research Protection Program - Purdue University
Ernest C. Young Hall, Room 1032
155 S. Grant St.,
West Lafayette, IN 47907-2114

Documentation of Informed Consent

I have had the opportunity to read this consent form and have the research study explained. I have had the opportunity to ask questions about the research study, and my questions have been answered. I am prepared to participate in the research study described above. I will be offered a copy of this consent form after I sign it.

_____ _____
Participant's Signature Date

_____
Participant's Name

_____ _____
Researcher's Signature Date

B. STIMULI PARAGRAPH - PERCEPTUAL TASK

When baking, the first thing you should do is gather your ingredients. You will need flour (any brand will do), sugar, salt, vanilla extract, milk, vegetable oil, baking powder, blueberries, and one egg. You can easily adapt this recipe if you prefer using a different fruit. The next part requires you to blend the flour, sugar, salt and baking powder in a mixing bowl. Add the remaining ingredients to this mixture, except for the blueberries. Hold the bowl carefully with one *hand* while mixing the batter until it is smooth. Gently fold the blueberries into the batter. Divide the batter evenly in your muffin tin and bake. Make sure to inspect the muffins often and remove them from the oven when they are golden brown. The final and most critical step is to taste one of your delicious blueberry muffins.

C. STIMULI PARAGRAPH - PRODUCTION TASK

Making pie crust can be a daunting task for the new or inept baker, but its a fact that a homemade crust makes the best pie. Just like when making muffins, it is important to first gather your ingredients. You will need flour (any brand will work), salt, butter, and ice cold water. In a large mixing bowl, mix the flour and salt. Then, cut in the butter until you have pea-sized crumbles. The next part involves adding enough cold water to the mixture to make a ball of dough that is neither moist nor sticky. Sprinkle flour on your counter and roll the dough into a thin round circle. Find the correct size pie tin and gently move your dough to the tin. You can easily adapt this recipe to be savory or sweet by choosing a different filling. After baking, make sure to taste the delicious pie you have made.

D. INSTRUCTIONS - PRODUCTION TASK

Participation in this study involves recording your own reading of a short instructional paragraph. You will be given a few minutes to become familiar with the content of the paragraph. After you have had a few minutes to become comfortable with the paragraph, the researcher will signal you to begin reading it aloud. Please read the paragraph aloud three times, leaving a short pause between each reading. Please also read the paragraph as naturally as possible, as if you are reading it to a close friend.

E. INSTRUCTIONS - PERCEPTUAL TASK

(as seen by participants)

Instructions

The purpose of this study is to determine the features contained in a speech signal that people use to form opinions about the personal characteristics of a speaker.

During this study, you will listen to a total of eight speakers each reading the same short instructional paragraph. Please listen carefully to each reading as you may only play each recording one time. After you listen to a paragraph, you will be asked to rate the speaker in regards to several characteristics. Please rate the speakers based on your initial reactions to the speech you hear. Please be sure to answer all questions before advancing to the next paragraph.

Thank you for your participation.

You may now advance to the next page of this survey and then click anywhere on the other computer screen to play the first recording.

F. SAMPLE SURVEY

(as seen by participants)

Paragraph 1

Speaker 1
Please indicate your response by selecting the circle that best corresponds with how you would rate the speaker for each of the characteristics given below.

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely	
successful	○	○	○	○	○	○	○	**unsuccessful**
friendly	○	○	○	○	○	○	○	**unfriendly**
uptight	○	○	○	○	○	○	○	**laidback**
insincere	○	○	○	○	○	○	○	**sincere**
old	○	○	○	○	○	○	○	**young**
wealthy	○	○	○	○	○	○	○	**poor**
undependable	○	○	○	○	○	○	○	**dependable**
educated	○	○	○	○	○	○	○	**uneducated**

G. SEMANTIC DIFFERENTIAL SCALES

SAMPLE SEMANTIC DIFFERENTIAL SCALES (WITH ADJUSTED NUMERICAL VALUES)

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely	
successful	3	2	1	0	-1	-2	-3	unsuccessful
friendly	3	2	1	0	-1	-2	-3	unfriendly
uptight	-3	-2	-1	0	1	2	3	laidback
insincere	-3	-2	-1	0	1	2	3	sincere
old	-3	-2	-1	0	1	2	3	young
wealthy	3	2	1	0	-1	-2	-3	poor
undependable	-3	-2	-1	0	1	2	3	dependable
educated	3	2	1	0	-1	-2	-3	uneducated
kind	3	2	1	0	-1	-2	-3	unkind
lazy	-3	-2	-1	0	1	2	3	hardworking
impolite	-3	-2	-1	0	1	2	3	polite
intelligent	3	2	1	0	-1	-2	-3	unintelligent
formal	3	2	1	0	-1	-2	-3	casual

H. RESEARCH PARTICIPANT DISCLOSURE FORM

Purdue IRB Protocol #: 1702018768 - Expires on: 10-APR-2018

RESEARCH PARTICIPANT DISCLOSURE FORM
Receipt of Compensation and Business Office Notification of Information Provided
Principal Investigator: _Dr. Mary Niepokuj__
Protocol Number: _____
Purdue University

I, the undersigned, acknowledge receipt of compensation in the amount of $_____ for my time and inconvenience as a participant in the above research study. I also acknowledge that the information provided below will be shared with the business office of Purdue University.

Name: _____ _____ _____
First *Middle Initial* *Last*

Address: _____

_____

_____

Social Security Number: _____ — _____ — _____

_____ _____
Participant's Signature Date

_____
Participant's Name

_____ _____
Researcher's Signature Date