

**Socially stratified phonetic variation and perceived identity in Puerto Rican Spanish**

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## **Abstract**

This dissertation examines the interaction between phonetic variation and perceptions of speaker identity in Puerto Rican Spanish. Using an interdisciplinary approach, three experiments were designed and carried out: (1) a descriptive study of stereotypes about sexual orientation and male speech, (2) an observational study examining the relationship between acoustic parameters and perceived sexual orientation, perceived height, perceived social class, and perceived age, and (3) an implicit-processing experiment examining the influence of social stereotypes on memory for voices.

The study was carried out in the San Juan, Puerto Rico, metropolitan area and included ninety-six participants. Results of the first experiment indicate that there is considerable uniformity in notions of speech variation associated with the gay male speech stereotype for the participants in the study, and that the most cited stereotypical markers of sexual orientation are related to stereotypical notions of gender. However, a majority of the respondents explicitly stated that although they realize a stereotype exists, they do not believe there is necessarily a correspondence between stereotypes of gay men's speech and real life production. Results of the second experiment show that listeners do evaluate speakers' voices differently in terms of perceived sexual orientation, and that perceptions of sexual orientation are most strongly predicted by one acoustic measure of vowel quality (the second resonant frequency of the vowel /e/, which relates to tongue position in the anterior-posterior dimension). An examination of the relationship between perceptions of sexual orientation and perceptions of height, age, and social class revealed that perceptions of height were correlated with perceived sexual

orientation. The third experiment showed that listeners responded more quickly to speakers previously rated as more gay sounding than they did to speakers rated as more straight sounding, and the slowest mean responses were for the deleted variant. Most significantly, a d-prime analysis showed the strongest signal detection in the case of the sibilant ([s]) when produced by stereotypically gay sounding speakers. The results suggest a relationship between /s/ variation and listener perceptions of sexual orientation as well as a possible effect of perceived sexual orientation on speech processing. Taken together, these results underscore the need for methods that measure both conscious and subconscious effects of stereotypes in speech production and perception.

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## Chapter 1

### Introduction

#### 1.1 Statement of the dissertation problem

This dissertation addresses how variation in pronunciation interacts with evaluations, or perceptions, of a speaker's social identity<sup>1</sup>. It is organized around the concept of *socioindexicality*, or the idea that certain patterns index (in the sense of the Latin root *indicare*, 'to point out, indicate') social information. The dissertation approaches socioindexicality from the perspective of sociophonetics. Sociophonetics, in general terms, "describes work at the intersection of sociolinguistics and phonetics" (Foulkes, 2006, p. 1), and as such holds that both social and phonetic data are necessary to fully account for phonetic and phonological patterns observable in human speech. Use of the term is relatively recent in terms of academic scholarship, with its first known use in 1974 (Foulkes and Docherty, 2006). It is used by phoneticians to refer to descriptive accounts of speech production differences across dialects and styles as well as by sociolinguists to refer to studies that examine relationships between phonetic and phonological form and social factors, with a special focus on language variation and change (Foulkes and Docherty, 2006). In this study, 'sociophonetic variation' is used in the sense articulated by Foulkes and Docherty (2006), who describe it as "variable aspects of phonetic or phonological structure in which alternative forms correlate with social factors" (p. 411).

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<sup>1</sup> I use the term 'social identity' in order to maintain consistency with previous work in the field. Social identity, in this case, is used in the sense of macrosociological categories that serve as a proxy for identity, rather than locally constructed microsociological categories.

While socioindexicality and sociophonetics as academic appellations have come into use relatively recently, the practice of making judgments about a speaker based on his or her phonetic production is certainly not new. An early documented (and often cited) case appears in the Hebrew Bible, in an account of a military defeat of the Ephraimites that occurred somewhere between 1370 and 1070 BC:

Gilead then cut Ephraim off from the fords of the Jordan, and whenever Ephraimite fugitives said, 'Let me cross,' the men of Gilead would ask, 'Are you an Ephraimite?' If he said, 'No,' they then said, 'Very well, say Shibboleth.' If anyone said, 'Sibboleth', because he could not pronounce it, then they would seize him and kill him by the fords of the Jordan. Forty-two thousand Ephraimites fell on this occasion. (Judges 12:5-6, New Jerusalem Bible)

Judging social attributes according to phonetic realizations has continued seemingly without break through modern times. Many studies have demonstrated that by listening to a voice alone, listeners are able to make evaluative judgments of basic sociological variables that contribute to the notion of identity, including a speaker's gender, age, country or region of origin, educational background, socioeconomic status, race, and self-identified sexual orientation. For example, Baugh (2000) and Purnell, Idsardi, and Baugh (1999) showed that listeners make judgments corresponding to a speaker's self-identified ethnicity based on simply hearing the word "hello", and that patterns of phonetic variation stereotypically associated with Chicano and African American ethnicity play a role in housing discrimination. Listeners have also been shown to make greater-than-chance judgments corresponding to a speaker's self-identified sexual orientation by listening to very short speech samples (Carahaly, 2000),

and at least one study has documented the negative impact of gay sounding speech on college admissions for both heterosexual and gay male students (Gowen and Britt, 2006).

The capacity for categorizing speakers based on voice alone is likely the result of a combined influence of societal stereotypes and an individual's own life experience. However, the specific factors that come into play in this process are not fully understood. One necessary step in disentangling the puzzle of socioindexicality is to document what type of phonetic variation influences perception. In this analysis, it is necessary not only to document socioindexical processes within languages, but also compare how the processes differ between languages. Comparisons of socioindexicality across languages thus far have suggested that social variants are arbitrary in nature (see, for example, Van Bezooijen, 1995; Stuart-Smith, 2007). This means that no linguistic production is exclusive to any social group, nor does any individual variant carry inherent social meaning; it is possible for any variant to be appropriated by any group in the performance of their social identity. Therefore, it is necessary to determine which cues carry social meaning, and in what context.

The lack of data on variables relevant to sociophonetic variation extends to the specific subject of this dissertation. The context that this dissertation examines is the perception of sexual orientation in Puerto Rican Spanish, and the specific cue in question is the syllable-final /s/. There are no studies that systematically explore the perception of sexual orientation in Spanish, and no data that provide clues about what phonetic cues are relevant in its perception, so the current study is an exploratory look at this issue.

## 1.2 Overview of the dissertation study

While there is a growing body of research exploring socioindexical variables and speech in English, there are few studies addressing this issue in Spanish, and, as mentioned above, none that address the specific topic of this dissertation, the perception of sexual orientation. The current study provides an initial survey of this topic by exploring the perception of sexual orientation from several perspectives.

The main perspective of the dissertation is of perception of sexual orientation and the potential socioindexical role of phoneme /s/ in syllable final position in the Spanish of Puerto Rico. The Puerto Rican Spanish dialect is known for being an “aspirating” or “deleting” dialect, where instances of syllable final /s/ in a word generally are realized in one of three ways: a sibilant [s], an aspirate [h]<sup>2</sup> or phonetic zero. Rates and occurrence of aspiration and deletion are influenced by linguistic contexts and are highly correlated to variables such as socioeconomic status, style of discourse, gender, and educational level. The primary dissertation experiment (detailed in Chapter Five) examines to what extent differences in the production of the /s/ have a relationship with listener perceptions of a speaker's sexual orientation.

While this was the primary study, its successful completion depended on two other questions not yet addressed in the literature concerning speech and sexual orientation in Spanish: the existence and principal elements of the stereotype of gay men’s speech, and the propensity of listeners to rate speakers in terms of perceived sexual

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<sup>2</sup> The use of the term aspiration in Hispanic linguistics is distinct from the term as used in general linguistics, which is used most often to refer to the burst of noise from the expulsion of air that occurs when a stop closure is released (Ladefoged, 2001). In Hispanic Linguistics, the term is most often used in the specific case of the voiceless glottal fricative allophone of /s/, represented by the IPA symbol [h].

orientation (PSO). In order to address these questions, two additional experiments were included in the study protocol. First, all participants in the study protocol completed a short interview in which they reported their opinions on speech stereotypes related to social categories, including sexual orientation (detailed in Chapter Three). Second, an independent group of listeners completed an explicit measures perception task in which they listened to voices and rated them in terms of different social characteristics, including sexual orientation (detailed in Chapter Four).

The bulk of studies that examine sociophonetic variation and speech (again, mostly in English) have done so via methods which explicitly mention the social variable in question. Recent research indicates that explicit mention of social categories may activate overt stereotypes about the variable in question, which can introduce intervening variables into the study. While these studies have provided a wealth of data on stereotypic associations between phonetic variation and speaker attributes, they have not addressed the extent to which these associations affect ongoing language processing. This dissertation fills this additional important gap in the literature through its main experiment, a primed, timed response task. This task has the benefit of measuring listener responses (and, by extension, associations between variants and perceived identity) free of the intervening variables that are likely present in explicit measures tasks.

It must be made clear from the outset that this is a study on the perception of social identity, and it does not seek to define “gay speech.” The idea that a monolithic “gay speech” exists is problematic in the same way that the idea of a monolithic “women’s” or “men’s” speech is problematic (see Eckert and McConnell-Ginet, 2003;

also Cameron, 1997). In addition, as Kulick (2000) notes, no study has reported any structural, morphological, or phonological feature that is unique to gay men or lesbians. Rather, any linguistic variable is one of many linguistic resources available to all speakers, rather than being one part of a monolithic speech style indicating prototypical masculinity or femininity, or a transgressive identity like “queer” or “butch.” While there is certainly a need for future studies to examine issues of speech and sexual orientation from a production perspective, the focus of this study is the perception of a speaker’s identity (in terms of sexual orientation) on the part of listeners. The aim is to explore the linguistic tools that are available to all speakers and listeners, and that may be used consciously or unconsciously as a tool for interpreting social identity.

It is also important to briefly mention the use of the terms gay and straight in this dissertation. As Kulick (2000) notes, “What to collectively call people whose sexual and gendered practices and/or identities fall beyond the bounds of normative heterosexuality is an unavoidable and ultimately unresolvable problem” (p. 243). The choice to use the terms gay and straight in this paper should not be taken as a global endorsement of their use. The decision to use the terms was made in consultation with several members of the community where the study data was gathered; they were determined to be the most accepted and most neutral terms in the community.

### **1.3 The significance of the study**

Beginning with the most specific context, the results of this study will make a unique contribution to the study of perception of sexual orientation in spoken Spanish. As mentioned, there are no studies that systematically explore the perception of sexual orientation in Spanish, and no data that provide clues about what phonetic cues are

relevant in its perception. This dissertation project uses an interdisciplinary approach to address the issue, presenting qualitative data on language attitudes from interviews, quantitative data from an explicit measures rating task, and quantitative data from an implicit measures voice recognition task.

This study also adds to the body of research on the perception of sexual orientation through phonetic variation in general. Since this question has been dominated by English language studies, there is little data available on how the elements of socioindexical variation vary across languages. For example, features that index sexual orientation in one language may or may not be related to perceptions of sexual orientation in another. Furthermore, the linguistic context in which factors become relevant may depend on local interpretation (Drager, 2008; Mack, forthcoming).

In addition, this study lends insight into methods available for studying speech and social identity. This study is one of few that use an implicit processing paradigm to explore associations between phonetic variation and social identity. Along with the pilot study referred to below (Mack and Munson, 2008), it is, as far as I know, the first study to use implicit measures to explore speech and sexual orientation. As such, it makes a contribution to the field's methodology as well.

On a broader level, the study contributes to the discussion of sociophonetic variation and phonological theory. Socioindexicality poses a challenge to phonological theory, especially speech perception. Johnson (2005, 2006) points out that while earlier theories of speech perception have taken the view that phonetic variability is "hardwired" (p. 485) in the neural structure and used in speech perception, the arbitrary nature of socioindexicality is a phenomenon that few phonological theories can account for. As an



example, Johnson's (2005) data shows that men's and women's vowel production, often cast as differing due to physiological differences in vocal tract size, actually varies between gender groups across languages. This indicates that there is some kind of arbitrary variation influenced by speaker gender. In other words, there is socioindexical variation that cannot be accounted for by vocal tract size. Foulkes and Docherty (2006) note that although sociophonetic variation is pervasive, it has played "a relatively minor role in the development of phonological theory" (410). Although the focus of this dissertation is not specifically on phonological theory, the results of the study will provide more data on the interaction between social factors and phonetic variation.

Finally, the study provides a new perspective on the well-established body of knowledge on /s/ aspiration and deletion in Spanish. This study of /s/ aspiration and deletion has provided important data used in the development of theories of language variation and change, and this dissertation provides a further contribution to this field of study.

#### **1.4 Description of the dissertation chapters**

The dissertation begins with a review of the literature, followed by a discussion of each of the dissertation's three experiments. It concludes with a discussion of the findings and areas for future research.

## **Chapter 2**

### **Literature Review**

#### **2.1 Introduction**

Four areas of inquiry provide the intellectual context for the experiments described in this dissertation. The first area, speech and sexual orientation, is described in Section 2.2. Although the broad topic of speech and sexual orientation has been approached from various perspectives in English, the focus in this section is on the data and methods associated with studies of phonetic variation. As we will see, many methods have been used to study the effect of phonetic variables upon listener judgments of sexual orientation in English, and there has been some degree of success in identifying relevant indexical cues. Section 2.3 presents the literature relevant to the study of stereotypes and sexual orientation, and discusses the potential impact of social stereotypes in tasks such as those used in this study. The next area of focus, speech and sexual orientation in Spanish, is described in Section 2.4. Although there are no known perception or production studies on phonetic variation and sexual orientation in Spanish, there are some anecdotal clues that point to elements associated with gay speech, and these are discussed in the context of the present study. In Section 2.5, the literature detailing what is known about the primary study's variable of interest, the /s/ in aspirating and deleting dialects Spanish, is considered. Finally, the chapter concludes with a summary and a statement of the experimental hypotheses.

#### **2.2 Speech and sexual orientation: phonetic variation**

Most studies that consider phonetic variation and sexual orientation have examined production and perception of North American English dialects of English.

These investigations have examined the influence of acoustic factors such as pitch range and pitch variability (Gaudio, 1994; Smyth et al., 2003; Levon, 2007), production of sibilants (Munson et al., 2006; Smyth et al., 2003; Levon, 2007), various aspects of vowel production, including both average F1 and F2 frequencies, and overall vowel-space expansion on listener perceptions of speaker sexual orientation (Podesva, Roberts, and Campbell-Kibler, 2001; Munson et al., 2006; Pierrehumbert et al., 2004). In addition, studies have investigated relationships between perceptions of sexual orientation and perceptions of other speaker characteristics such as height, speech clarity (Babel and Johnson, 2006; Munson et al., 2006), speech style (Smyth et al., 2003), as well as personal attributes and mental states, such as whether the speaker is neat or messy, kind or mean, overweight or skinny, and in a good mood or a bad mood (Gaudio, 1994; Levon, 2006; Smith, Munson, and Hall, 2008).

These studies have focused on both production (analyzing and/or comparing characteristics of recorded speech data) and perception (analyzing and/or comparing listener evaluations of speech samples and their possible correlation to acoustic characteristics). The bulk of studies in the past 15 years have used a combination approach, analyzing speech from self-identified gay and straight talkers in one part of the experiment, gathering listener judgments of perceived sexual orientation in another, and examining the connections between the two. In addition, most studies have made explicit reference to sexual orientation in the study methods, a point to which we will return later. Although many variables have been discussed as possible correlates for judgments of perceived sexual orientation, some of the main areas investigated by studies so far in

English have been the effect of mean fundamental frequency, fundamental frequency or intonational variability across utterances, sibilant production, and vowel variability.

Gaudio (1994) explored the stereotypical elements of gay speech by specifically focusing on the idea that gay men's intonation in English is more "dynamic" as compared to non-gay men. In the study, he analyzed the pitch properties of eight volunteer subjects (four self-identified gay men, four self-identified straight men) in what he called "an initial attempt toward the study of gay male speech." Speakers read and recorded two short passages, an accounting text and a monologue from a play. In a large-group session, listeners heard 15-second samples of the recordings in randomized order and filled out a response sheet for each speaker. For each speaker, the listeners were presented with 16 different semantic pairs and were instructed to choose one of two options. The pairs included straight/gay, effeminate/masculine, reserved/emotional, and affected/ordinary. Listener perceptions of sexual orientation were accurate overall for both speech samples, and listeners tended to rate voices they perceived as gay-sounding as effeminate, and those they perceived as straight-sounding as more masculine. Neither gross pitch range nor restricted pitch range had significant correlations to the listeners' ratings. Similarly, a correlational analysis of pitch variability and perceived sexual orientation showed no significant correlations except in one case. Gaudio (1994) concluded that absolute pitch and pitch range do not represent a feature to which listeners attend in making stereotyped judgments in men's speech such as gay or straight, masculine or feminine, and suggests that intonational variability may play a role. However, data from the study do not indicate how this intonational variability may operate.

Avery and Liss (1994) carried out a two-step protocol to investigate the differences between less-masculine-sounding and more-masculine-sounding male speech. A group of 35 women rated a series of speech samples as less masculine sounding or more masculine sounding. The most prototypical more-masculine and less-masculine voices were selected based on the listener ratings. The group was further limited by selecting four more-masculine-sounding voices and four less-masculine-sounding voices with the most similar fundamental frequency values. In the second part of the experiment, the researchers made acoustic measures of the fundamental frequency contours, the vowel formant midpoints, and the third and fourth spectra of two fricatives. The groups differed in prosodic contours, vowel formant values, sibilant energy distributions, and rates of articulation.

The possibility of fundamental frequency as a differentiating factor in listener perception was also investigated in Smyth, Jacobs, and Rogers (2003). Speakers produced speech samples using different types of readings to simulate different styles, and listeners recorded their rating of sexual orientation, as well as their confidence level in the rating. The researchers analyzed the stimuli speech and concluded that fundamental frequency did not differ significantly between voices rated as gay- and straight-sounding, nor was there a significant relationship between mean fundamental frequencies of a talker and how often he was judged as gay sounding or straight sounding. Listener groups gave lower confidence ratings for higher-pitched voices on one of the passages, and talkers who had a wider pitch range received lower confidence scores. The authors concluded that pitch range and variability are, at the most, a weak

cue in judgments of sexual orientation, and are most likely superseded by other phonetic cues.

Munson, McDonald, DeBoe, and White (2006) conducted a large-scale study comprised of three experiments to examine the acoustic and perceptual correlates of judgments of sexual orientation. The first experiment examined how men and women differ in production of vowels, /s/, and /ʃ/ in read speech. The data was gathered from single word stimuli (32 CVC words) produced by 44 men and women talkers between 18 and 40 years of age who identified themselves as heterosexual or as gay, lesbian, or bisexual (GLB). Acoustic analyses showed that the main differences between GLB women and heterosexual women were the F1 frequency of the front open-mid vowel and the F2 frequency of the back rising diphthong. Heterosexual and GLB men differed in the F1 frequency of the open-mid front vowel, the lower front open vowel, and the spectral skewness (the differences in the amount of energy found at different frequencies) of the fricative /s/.

In Experiment Two, 40 listeners were asked to report their perception of sexual orientation while listening to a subset of 12 words from the stimuli produced for Experiment One. The words included three words each from distinct phonetic compositions: front vowels and sibilant fricatives, front vowels and no sibilant fricatives, back-round vowels and sibilant fricatives, and back-round vowels and no sibilant fricatives. The perceived sexual orientation experiment was embedded in a protocol including four tasks. In each task, listeners rated only 11 speakers, although the speakers varied in each task so that each listener listened to all 44 talkers. In addition, listeners

made only one type of rating for each talker, thus eliminating the possibility that a rating on one variable would affect their rating of another variable.

In the first task of Experiment Two, participants were asked to identify talker sex. This was done in order to ensure that the sex of all talkers would be reliably identified. Listeners were very accurate in judging sex of the talkers, at an overall rate of 99% accuracy for male talkers and 97% accuracy for female talkers. In tasks two and three, participants were asked to rate talker height and clarity of speech, respectively. The results of tasks two and three form the basis for Experiment Three (discussed below). The fourth task was the perceived sexual orientation task. Results showed that words containing low front vowels triggered more accuracy in perceived sexual orientation judgments of male speakers' sexual orientations than words containing back vowels. In addition, judgments of male sexual orientation were influenced by /s/ skewness, the F1 frequency of low front vowels, and the F2 frequency of back vowels. F2 frequency of back vowels also predicted judgments of women's sexual orientation, along with the F1 frequency of low front vowels.

Experiment Three of Munson, McDonald, et al (2006) explored the relationship between perceived speech clarity, perceived talker height, and the judgments of perceived sexual orientation from Experiment Two. Listening to the same stimuli as the first experiments, listeners reported their judgments of perceived height and perceived speech clarity. These results were then compared with the data from the second experiment to assess how judgments of sexual orientation were related to other perceptual judgments for the same speech stimuli, and also to assess how measures of perceived sexual orientation are predicted by judgments of perceptual characteristics "more robustly coded

in the speech signal" (206). There were statistically significant correlations between judgments of talkers' sexual orientation and judgments of perceived height. Men rated as sounding taller by Experiment Three's listeners were rated as sounding heterosexual by Experiment Two listeners, while women who were rated as sounding taller were rated as more lesbian/bisexual sounding.

Levon (2006) also investigated perceived sexual orientation and pitch, but used a relatively novel method for stimuli creation. To create the study stimuli, he made a base stimulus by recording one male reading a passage with neutral content. Then he used digital manipulation software to shorten syllable duration and narrow pitch. Each listener heard two of the four possible stimuli combinations: +/- short (duration) and +/- narrow (pitch). Instead of rating the speakers simply as gay sounding or straight sounding, listeners rated each stimulus on 10 affective scales, similar to Gaudio (1994), which included: generous/greedy, lazy/hardworking, prudish/promiscuous, effeminate/masculine, aloof/friendly, straight/gay, neat/messy, savvy/naïve, kind/mean, and genuine/fake. There were significant correlations between ratings given for the affective scales, which is an important finding, as it suggests that perceptions of sexuality do not operate independently of other perceptions, but rather are part of a complex construction of personal identity. However, the changes in syllable duration and pitch did not affect ratings at a statistically significant level for any of the combinations. The lack of a significant effect of the manipulations may be due to the fact that "multiple auditory cues act in concert to produce a holistic index of gayness" (68). Levon (2006) suggests that it may be useful to consider phonetic variables in clusters of more than two in order to affect listener judgments.



Munson and Zimmerman (2006) used somewhat similar methods for stimuli creation in their investigation stereotypes and /s/ production. The stereotype in question was gay men's production of the /s/; the question was to what extent different articulations of the /s/ influence perceived sexual orientation. While Levon (2006) limited his base to just one talker in a monologue, Munson and Zimmerman (2006) used base recordings of single-word stimuli from many talkers. This allowed for a more robust statistical analysis when combined with the listener perceptions of sexual orientation. The digitized tokens were produced by concatenating the naturally produced bases with digitized tokens of /s/ produced by a trained talker. These tokens and the original, unedited recordings were the stimuli. For each token, then, all variables except the variable of interest (the /s/) were held constant, and differences in listener perception were attributable to variation in the /s/.

Three experiments were conducted. Experiment One examined listener perception of sexual orientation, and found that men were rated more gay sounding when an incorrectly articulated /s/ was appended, and that the effect was greater for men who had been rated as very heterosexual sounding. Experiment Two examined listener perception of accuracy, and it found that the tokens that had been rated as more gay sounding in Experiment One were also rated to contain an inaccurately produced /s/. Experiment Three assessed to what extent listeners' perceptions of talker ages were affected by the different types of /s/ that the stimuli words contained. The listeners were told that talkers ranged in age from 12 to 60 years, and that they must estimate the talker's age to the nearest year. Listeners rated the words with a misarticulated /s/ as being produced by younger talkers. Taken together, the results of the three experiments

confirm that the stereotypical notion that gay men produce /s/ differently from heterosexual men does influence listener judgments of sexual orientation.

Finally, a somewhat different approach has been offered by Podesva (2006, 2008) and Podesva, Roberts, and Campbell-Kibler (2001). These studies highlight the importance of the interactions between style and social meaning. They maintain that speakers vary their styles in order to perform not only gay or straight identities, but distinct identities within gay or straight styles. Rather than conceptualizing variation as corresponding to the simple gay/straight dichotomy, it is worthwhile to examine how individual idiosyncrasies come together to index different kinds of stereotypical gay or straight speech.

In summary, results of previous studies focusing on the perception of sexual orientation in English reveal that patterns of phonetic variation correspond to judgments of sexual orientation, but that the exact nature of the patterns is not always clear. In addition, the variation and judgments do not always correspond to stereotypical speech profiles assigned to social groups by popular culture (Munson and Zimmerman, 2006). It also seems that there are possible interactions between judgments of sexual orientation, personality, and physical characteristics, all of which are interrelated components of social identity.

### **2.3 Stereotypes and speech processing**

As can be seen from the discussion thus far, most previous studies examining phonology and sexual orientation in English have attempted to sort out the complex puzzle by directly eliciting judgments of perceived speaker sexual orientation. This

method presupposes that listener perception functions in a very straightforward way: a voice is heard, and a judgment is made.

However, work in linguistics and cognitive psychology suggests that the process of perception is more complex, and is influenced by a variety of factors, including social stereotypes. In other words, there is a multi-directional relationship between judgments of speaker attributes and perception of phonemes. The McGurk effect famously showed that visual input and auditory input interact in low-level speech processing (McGurk and McDonald, 1976); an increasing number of studies have shown that similar types of interactions occur between listeners' ideas of speaker social identity (and the speech stereotypes associated with that social identity) and auditory input. For example, Niedzielski (1999) shows that regional linguistic stereotypes interact with the perception of vowels. In each study trial, study participants from Detroit listened to a sentence and were told to concentrate on a specific vowel in a specific word. After hearing the sentence, the listeners heard six computer-resynthesized vowels and picked which of the six was the most similar to the vowel from the earlier sentence. All listeners heard the same speaker for all trials; the only difference was that half of the listeners' test materials had "Michigan" written across the top and half were labeled with the word "Canadian." There was a significant difference between the two groups' answers, and, furthermore, participants who received the "Canadian" materials matched the vowel more often with a raised token than those who received the "Michigan" materials. In other words, the perceptual boundary of the vowel varied according to whom the listener thought they were listening to—a Canadian or a Michigander. As Niedzielski summarizes, "social information is used by listeners to calibrate the phonological space of speakers" (p. 22).

Another case of regional stereotypes and shifting perceptual boundaries is documented in Hay, Nolan, and Drager (2006). In methods similar to Niedzielski (1999), participants (all New Zealanders) had the task of matching three different vowels to computer-resynthesized vowels on a six-level continuum. In addition to presenting the word phrase-medially, as Niedzielski did, the researchers also included stimuli where the target vowel appeared phrase-finally. They found that listeners in two groups identified the vowels with statistically significant differences, depending on whether the paper response sheet had “Australian” or “New Zealander” written across the top.

Other studies have shown that listeners' ideas of speaker gender also affect the perception of phonemes. Strand and Johnson (1996) found that listener perception of fricatives changed according to expectations of speaker gender. Strand (1999) found that listeners identified identical sounds differently, as [s] or [ʃ] (for example, in words like 'sack' and 'shack,' respectively), when the phoneme was held constant but the gender of the speaker was identified as male versus female.

These studies all point to the notion that we actually 'hear' people differently based on our ideas of their social identity. In a way, this idea is not novel; literary theory has long acknowledged the role of the reader and contextual information in the creation of meaning and knowledge. Just as our reading of a particular text changes based on our background knowledge, so does our perception of speech change based on our ideas of the speaker's identity. This means that any approach to questions of social identity and phonology should take into account the fact that the way in which sounds of speech themselves are perceived is influenced by listener evaluative judgments of social identity.

One approach to take this into account is to elicit listener perceptions in a less explicit way by using priming experiment methods. As evidenced in Niedzielski (1999), Strand (1999), and Hay, et al. (2006), priming experiments set up an expectation or judgment in the priming phase and then measure how a given variable is affected by that expectation in a test phase. The first priming experiments considered semantic associations between lexical items, looking at the latency effect in associated and non-associated objects (Fazio, 2001). For example, a prime of the word “doctor” was found to facilitate the identification of the word “nurse” as a real word (as opposed to a non-word) in the test phase. These findings suggested that the presentation of a word automatically activated not just the strict semantic meaning of the word, but also related concepts (Fazio, 2001).

Priming experiments were extended from examining semantic associations to attitude associations in the 1980's. Fazio, et al. (1986) investigated how individuals' attitudes toward a given stimulus (or “attitude object”) in the prime phase impacted the speed with which they responded in the test phase. In the study, the concepts shared either a negative or a positive connotation, but were not semantically related. The researchers first collected participant evaluations of a number of attitude objects, then used these objects in the priming experiment. In the priming experiment, the participants' task was to determine whether the test phase object was positive or negative. As with the semantic association priming experiments, congruence was the important factor. If the attitude object presented in the prime phase shared an evaluative connotation with the object in the test phase, responses were facilitated. For example, if an individual had evaluated the word “cockroach” as negative in the initial participant evaluations, it was

assumed that it would activate a negative evaluation in the prime phase of the experiment. The congruence of the evaluation with the test phase stimulus would then positively affect participant response times and make them faster. In other words, if the prime “cockroach” was followed by a test phase word that was positive (for example, “appealing”), individuals were slower to respond that it was positive than they were to respond that a test phase word was negative (for example, “disgusting”) (Fazio, 2001, 116). Priming methods are now commonly used in behavioral and cognitive sciences and social psychology. In particular, they are used to investigate the automatic activation of sociocultural identity and sociocultural value judgments, such as racial and gender stereotypes.

Priming techniques also have been used to examine low-level speech processing, social stereotypes, and variable phoneme production. While there are relatively few speech studies that have exploited these methods, those that have, including Hay, Nolan, and Drager (2006), Hay, Warren, and Drager (2006), Niedzielski (1999), and Strand (1999), confirm that there are associations between speech processing and stereotypes about speech. These studies created listener bias by using visual cues. The results show that stereotypes about pronunciation are represented cognitively, and are tacitly invoked in processing tasks.

The main benefit of priming techniques is that they offer a form of implicit measurement. In other words, priming provides a way to access the automatic processes of speech recognition and processing, and to measure the variable of interest without the need for a direct report from participants in the study. In this way, results are free of what Fazio and Olson (2003) term “social desirability concerns,” which stem from

listeners' feelings about the variable in question. For example, when listeners are asked to say if speakers “sound gay” or “sound straight,” a pre-existing stereotype is invoked in listeners' minds, which may give rise to bias or suppress bias. Furthermore, the case can be made that this bias (or bias suppression) exists on multiple levels, complicating the issue of direct elicitation even more. On an individual level, listener responses can vary according to the persona they want to display to the researcher or for the study, or to correspond with their ideal persona (as liberal or conservative, for example). Although this variable may be documented by doing detailed listener attitudes surveys, it is nonetheless difficult to control and complicates analysis. On a societal level, a society's acceptance or non-acceptance of practices outside of heteronormative social behavior may intervene. Listeners native to a culture where being gay has a less taboo status risk less by judging someone (or someone's voice) as gay sounding as compared to listeners native to a culture where gayness is more stigmatized. While judgments in a priming experiment may well be affected by these cultural norms as well, looking at implicit associations provides a way to avoid the conscious presence of issues of social desirability.

#### **2.4 Speech and sexual orientation in Spanish**

In Spanish, the topic of speech and sexual orientation has been investigated from the perspective of literary analysis, the study of lexical items, and discourse analysis. For example, Sívori (2005) discusses the verbal interactions of the gay community of Rosario, Argentina. He uses the term *el habla de las locas* to refer to the speech of effeminate homosexuals (*las locas*, 'the crazy ones,' feminine plural form) who imitate and exaggerate stereotypical feminine behavior, including stereotypical feminine speech.

This stylistic component is captured in the term *mariconear* (78). Speakers can “*actuar como marica*” (the intransitive use of the verb) or “*hacer marica*.” The linguistic means to *actuar como marica* include changing all lexical gender markers of Rioplatense standard speech to feminine forms and using stereotypically feminine lexical items in place of masculine ones. For example, to identify someone as homosexual, those who are in the community use the term *maricona* [while those who are not part of the community use *maricón* 'faggot' (77)], and *traje* 'suit' becomes *vestido* 'dress' (78). Another characteristic of the speech community is codeswitching. One can *hacer marica* in certain situations and switch to a more neutral code in others. According to Sívori, using the community linguistic code is a strategy for creating and taking advantage of opportunities to establish legitimacy for members' own experiences and a homosexual point of view.

Peña's (2003) study of the gay bilingual community of Miami examines the lexical tools used by that community to express identity and group membership. She highlights the innovative nature of gay bilingual speech, noting that they use Cuban Spanish, English and “Spanglish” in order to construct communities and transnational identities. Speakers use Cuban slang when referring to the terms related with their gay identity and use code switching and word play as bilingual linguistic innovations, creating a transcultural gay identity. The word “pájaration” is an example of this. The term, used in a joke in a popular drag performance, is formed by adding the English suffix to the Spanish *pájaros*, a derogatory slang term for gay men, and giving the word an English pronunciation. “*Aquí hay mucha...pájaration...*” goes the joke, describing the scene on Miami Beach. Understanding the joke marks the bicultural audience members



as insiders; listeners must know both linguistic codes, and be able to recognize the incongruence of the two terms put together.

While Sívori (2005) and Peña (2003) have documented linguistic tools like gender switching and lexical innovation used by gay communities, documentation of phonetic variation associated with gay stereotypes and gay speakers has remained limited to anecdotal accounts. There are no systematic studies that have elicited production or perception data on gay, lesbian, bisexual, or transgender speech considering any phonetic variable in Spanish. Furthermore, it is difficult to find any sources that make explicit reference to gayness; more commonly, discussions of speech variability and male sexuality rely on allusion to effeminacy rather than overt mention of gayness. It is clear that equating effeminacy and gayness gives rise to a host of methodological issues (see Kulick, 2000), but these concepts have been found to be distinct, yet correlated, perceptual parameters in English (Levon, 2006; see also Munson, 2007). Outside of English, effeminate speech styles have been linked to stereotypes of homosexuality in francophone Canada (Higgins, 2004), as well as in Indonesia (Boellstorff, 2004). Most relevant to the current study, Murray (1995) notes, “In the Spanish-speaking cities of both Old and New Worlds, there is a consistent derogation of male effeminacy and a widespread assumption that such effeminacy is the mark of homosexuality” (180). In a discussion of Mexican sexuality, Carrier (1995) notes: “From early childhood on, Mexican males are made aware of the labels used to denote homosexual males--*pinto*, *joto*, *maricón*—with the clear understanding that these homosexual males are guilty of unmanly, effeminate behavior” (17).

The anecdotal evidence regarding speech and effeminacy (which here is extended to include perceived sexual orientation) points to both shared and diverging stereotypical elements in English and in Spanish. For example, Sowards (2000) presents interview data from Mexico that links “a high pitched voice” (146) to effeminate behavior in general, mirroring the association with fundamental frequency and sexual orientation explored as part of the gay speech stereotype in English by Gaudio (1994) and others. On the other hand, while the influence of vowel characteristics on listener evaluations has been documented in English, potential differences in vowel production are not as readily evident in anecdotal characterizations of stereotypical gay male speech in Spanish. This may be due in part to the relative stability of the Spanish vowel system. Dalbor (1980: 148-49) states, “Spanish vowels are quite uniform from dialect to dialect. In fact, the Spanish vocalic system is simpler, more uniform, and more symmetrical than that of any other language commonly studied...” More recently, Schwegler and Kempff (2007: 30) posit “*Las vocales en español son, generalmente, muy estables; la variación en su pronunciación, sobre todo al compararla con la de las consonantes, es poca.*” ‘Vowels in Spanish are, generally, very stable; variation in their pronunciation, especially in comparison with that of consonants, is little’ (translation mine). Nonetheless, stylistic and regional variation does occur. Harmegnies and Poch-Olivé (1992) reported differences in stressed and unstressed vowel realizations in spontaneous and laboratory speech situations. They observed a highly significant centralization tendency in /e/, /i/, /o/, and /u/, with more marked centralization in the front vowels in spontaneous speech. In Puerto Rican Spanish, Santoro (2007) reports higher and more open vowels than occur in the Spanish of Spain. Holmquist (2001) and Oliver Rajan (2007) report vowel raising in

unstressed contexts (/e/ to [i] and /o/ to [u]) in western Puerto Rico that is correlated to both phonological and social factors. However, although the phenomenon of vowel raising is sociolinguistically correlated with gendered speech, thus far vocalic variation has not been linked to stereotypical masculine or effeminate speech.

Another stereotypical association between speech and male sexual orientation in Spanish, as in English, are distinctive patterns of /s/ production. As mentioned above, studies in English have shown listener sensitivity to a more hyper-articulated /s/; anecdotal evidence from Spanish points to a possible connection between distinctive patterns of /s/ production related to a specific phonological process that occurs in Caribbean Spanish, aspiration and deletion of the /s/. These patterns correspond to a carefully or hyper-articulated /s/ in situations where syllable-final /s/ is often produced as [h] or deleted altogether, and, in some cases, /s/ epenthesis. In a discussion of standard and local linguistic norms in Dominican Spanish, Zentella (1993) cites the comic, often mocking phrase “*hablar fisno*,” a play on the expression *hablar fino* (‘to speak fine’), in which hypercorrective /s/-epenthesis occurs at the end of the first syllable in the word *fino*. The phrase *hablar fisno* is used in several dialects, but is seen as an especially apt commentary on Dominican Spanish. Although the weakening process is very advanced in the dialect, speakers realize that the absence of [s] is stigmatized, and insert [s] in the syllable rhyme, even in places where there is no underlying /s/, in an attempt to sound more educated, as in the case of *abogado* ‘lawyer’ > *asbogado* or *abosgado* (Nuñez Cedeño, 1994: 30). While *hablar fisno* is often equated with formality, higher socioeconomic status, or “posh speech” (Roca, 2005: 38), it has come to be associated with male effeminacy in some contexts (Zentella, 2003: 60).

In summary, although there is anecdotal evidence that specific ways of speaking cue evaluations of male gayness in Spanish, and that some of these patterns of variation are associated with multiple social identities (such as gayness and social class), there is no systematic examination or documentation of what those cues might be, or how they may interact with different ideas of speaker social identity. After considering the anecdotal evidence, it seems that the production of the /s/ is a likely potential element of the *stereotype* of gayness, and, as such, is a beginning point. As Levon (2006), states,

...the only way to determine which features or combinations of features come together to index gayness for listeners is to continue conducting experiments that isolate specific linguistic variables and test these variables...(69).

The decision to examine /s/ variation was further influenced by the high level of correlations between /s/ production and social factors in aspirating and deleting dialects, which is the focus of the next section.

## **2.5 Spanish /s/ variation**

### **2.5.1 Overview of aspiration and deletion**

Before beginning the rest of the literature review exploring the social correlates of /s/ aspiration and deletion and detailed results of variation studies, it may be helpful to provide a brief overview of aspiration and deletion in Spanish. Both syllable-initial and syllable-final aspiration and deletion has been documented in areas of the Spanish-speaking world [see, for example, Brown (2005), Lipski (1984)], although syllable initial aspiration and deletion is rare. In the case of syllable-final aspiration and deletion, there are a number of dialects of Spanish in which a weakening process has resulted in three allophonic variants of the /s/: the [s], generally recognized as the prestige variant, the

aspirated [h], and phonetic zero form, which is also referred to as the ‘elided’ or ‘deleted’ variant.<sup>3</sup> As mentioned earlier, this use of the term aspiration is different from the term as used in general linguistics (see Footnote 1).

The specific linguistic and extra-linguistic factors favoring aspiration and deletion will be discussed in detail later, but, in general, aspiration and deletion has been documented to occur in the following syllable-final contexts:

1) Word-internal, before a consonant

esto > e[h]to > e[0]to 'this'

2) Word-final, across word boundary, before a consonant in the following word

las papas > la[h] papas > la[0] papas 'the potatoes'

3) Word-final, across word boundary, before a vowel in the following word

las alas > la[h] alas > la[0] alas 'the wings'

4) Word-final, before a pause

alas > ala[h] > ala[0] 'wings'

Aspiration and deletion in Spanish follows a pattern of /s/ weakening documented in other Romance languages, including French and Italian (Seklaoui, 1989) and in other Indo-European languages such as Sanskrit, Armenian, and Breton (Meillet, 1969). Many scholars agree that word-final /s/ was subject to weakening processes early on in Latin,

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<sup>3</sup> While [s], [h], and phonetic zero are the three most common variants, it is important to note that other variants occur throughout the Spanish-speaking world. For example, López Morales (1983) included an assimilated /s/ in the first stage of data analysis in his comprehensive treatment of Puerto Rican Spanish, but found too few instances of it to include in his larger-scale analyses. Turnham and Lafford (1995) analyzed the velar fricative [x] variant in Madrid. Another variant, the glottal stop, is documented in areas of Spain (Cortés Gómez, 1979, as cited in Valentín-Márquez, 2006), Argentina (Fontanella, 1973), and the Philippines (Lipski, 2001). Valentín-Márquez (2006) provides a comprehensive overview of /s/-glottal stop variation, and documents its current use in Puerto Rico.

before the language's fragmentation into Spanish and the other Romance languages, although the extent to which it was lost and the nature of its reintroduction have been a topic of scholarly debate (Wallace, 1984). Levin (1971) gives the example from Cicero's *Orator*, where Cicero mentions the absence of the /s/ in speech, noting the sibilant loss preceding a consonant and sibilant retention preceding a vowel:

*Quin etiam, quod iam subrusticum uidetur, olim autem politius, eorum uerborum quorum eadem errant postremae duae litterae quae sunt in optumus, postremam litteram detrahebant nisi uocalis insequabatur. Ita non erat ea offensio in uersibus quam nunc fugiunt poetae noui; sic enim loquebamur qui est omnibu princeps non omnibus princeps, et uita illa dignu locoque non dignus.*

‘Moreover, something that now seems rather boorish but was formerly more refined—they used to take off the last letter of the words whose last two letters were the same as in *optumus* ('best'), unless a vowel followed. Thus there was not that dissatisfaction in verses which the modern poets now avoid; for we used to talk this way: *qui est omnibu princeps* ('who is leader to all'), not *omnibus princeps*, and *uita illa dignu locoque* ('worthy of that life and rank') not *dignus*' (translation from Levin, 1971, p. 319).

Levin (1971) maintains that the change in social meaning (as evidenced by Cicero's “now boorish but formerly refined” assessment) was linked to an increased level of formal education among the cultured circles of Rome, especially the study of Greek, which did not share a parallel weakening. However, Alba (1990) notes that lower class pronunciation followed the older pattern of /s/ weakening even as the more cultivated classes made retention of the /s/ the fashionable pronunciation. Although the weakening

process in Classical Latin was stalled and eventually reversed due to efforts of writers and other members of the Roman learned class, this example shows that the relationship between production of the /s/ and social variables has a rich history. Similar to the current day, a conservative pronunciation, with the sibilant retained, became a preferred variant of the cultivated classes, while the lower classes preserved the weakened version (for a time, at least).

Today, /s/ weakening and accompanying adjustments are considered complete in French and Italian, but Spanish still presents a case of observable ongoing change (Seklaoui, 1989; see also Terrell, 1981). Although it is likely, it is not clear that /s/ weakening will follow the path to eventual loss as in the case of French and Italian. As Seklaoui notes, “[i]t is impossible to say when, or even whether, word-final [s] will eventually disappear completely from all Spanish dialects in which its weakening is attested” (p. 192).

The variable production of the /s/ in Spanish is a defining element of dialect classification. Henriquez Ureña (1921) posited that final /s/ was a differentiating characteristic of lowland and highland dialects of American Spanish. Later, Resnick (1975) identified the retention of syllable and word-final /s/ as one of four primary variables used as part of his classification system for Latin American dialects. Today, /s/ aspiration and deletion is seen as characteristic of the speech of various regions of Spain and the Americas (Alba, 1990). As we will see in the following review, the process of aspiration and deletion has advanced to different stages in each of the places where it is found. Although general trends can be seen when the data is viewed from a panoramic perspective, the process is more advanced in some areas than in others. For example,

López Morales (1983) and others (for example, Nuñez Cedeño, 1994) report that the process is more advanced in the Dominican Republic than in Puerto Rico and Cuba.

Documentation of the variable production of /s/ as a social marker is plentiful, with variable production shown time after time to be contextually dependent and correlated to social variables. Terrell (1979) notes:

All who have written on aspiration and deletion in various parts of the Spanish-speaking world have noted that these processes are socially and stylistically stratified, that is, the use of the aspirated phones or the deletion of the phonemes is not obligatory and the phonetic output varies according to the socioeconomic class of the speaker and the social situation in which he finds himself. (p. 599)

While the social picture of /s/ production is the focus, the functional load that the /s/ carries is also important. The large functional load the /s/ carries contributes to making its variable production such a complex and interesting question from a formal linguistic point of view, in addition to the sociolinguistic point of view. Cedergren (1978) says:

*¿Por qué hablar todavía de la S en un simposio sobre la dialectología del Caribe hispánico, si todos sabemos que en el Caribe, la S se aspira y se elide? Quizás a causa de la situación privilegiada de la S en la gramática del español, que nos obliga a considerar tanto los aspectos fonéticos de la lengua como los aspectos gramaticales; la S final marca tanto el plural nominal como la segunda persona singular del verbo en la conjugación. Quizás también porque la marca redundante de pluralidad en el sintagma nominal nos permite examinar de cerca un área donde la fonología y la sintaxis se intersectan.*



Why still talk about the S in a symposium about Caribbean Hispanic dialectology, if we all know that in the Caribbean, the S is aspirated and deleted? Maybe it is because of the privileged status of the S in Spanish grammar, that obliges us to consider the phonetic aspects of the language as well as the grammatical aspects; the word-final S marks the noun plural as well as the second person singular of the conjugated verb. Maybe also because the redundant marker of plurality in the noun phrase permits us to closely examine an area where phonology and syntax intersect. (p. 37, my translation)

The prevalence of /s/ aspiration and deletion, its history, and its socioindexical reach give it another important aspect: its potential insight into language variation and change. Lafford (1986) casts her own study of /s/ variation in this light:

*[E]ste estudio cuantitativo sirve para ilustrar el poder diagnóstico-social del uso relativo de las variantes [s], [h] y [0] para comunicar información estilística y social del habla estudiada y el papel que ejercen estos factores emotivos y fisonómicos en el proceso del cambio lingüístico.*

This quantitative study serves to illustrate the social diagnostic power of the relative use of the variants [s], [h], and [0] to communicate social and stylistic information of the studied speech and the role that these emotional and physiognomic factors play in the process of linguistic change (p. 53, my translation).

An examination of the variable production of the /s/ is a rich area of investigation for historical linguistics, phonology, syntax, language variation, and dialectology. The present study focuses on the social aspects of /s/ variation, but it is important to keep in

mind that all of the above aspects work in a complex interplay. While the wide variety of influences on /s/ variation make it a challenging area for research methods, the collage of factors that come together to create more than a sum of its parts makes it fertile ground for investigating larger issues of language and identity. As Cedergren (1978) summarizes,

*Podríamos concluir que el tema de la S es propicio para postular teorías sobre la naturaleza de los mecanismos lingüísticos que generan estas formas, la caracterización de reglas, los fundamentos naturales de fenómenos lingüísticos y la relación entre lengua y sociedad.*

We may conclude that the subject of the /s/ is suitable for postulating theories about the nature of linguistic mechanisms that generate these forms, the characterization of rules, the natural fundamentals of linguistic phenomena and the relation between language and society (p. 37, my translation).

The following section provides an overview of the factors influencing /s/ aspiration and deletion, detailing results from studies that approach the issue of aspiration and deletion from different perspectives. The goal of the discussion is to illustrate that the variable production of the /s/ has a well-established and well-documented relationship with some significant aspects of social identity, which in turn makes it a plausible candidate for a relationship with sexual orientation. The section is divided into two areas: extra-linguistic influences and linguistic influences.

### **2.5.2 Extra-linguistic influences**

Quantitative studies on the variable production of the /s/ and the social factors that influence it have revealed a set of common trends. The findings vary by region and by

proportion (López Morales, 1983), but overall there are relatively clear patterns of /s/ variation according to social variables of gender, age, socioeconomic class, and level of education, in addition to linguistic variables.

Cedergren's (1978) analysis of Panamanian Spanish included interviews with 79 men and women from four socioeconomic and intergenerational groups and with varying lengths of residence in the capital city of Panama. Her findings illustrate the correlation between instances of aspiration/deletion and social characteristics. Aspiration tended to occur more in younger people than older people, and older people tended more towards deletion. Women also tended to aspirate more than men, while men tended to delete more than women. The age at which speakers arrived in Panama City also made a difference: those who took up residency in the city between infancy and adolescence showed more aspiration, while those who were born in Panama City deleted more. Aspiration was observed more in the lower class groups than the upper class, while the upper class eschewed deletion entirely. A VARBRUL<sup>4</sup> analysis that considered all social and linguistic variables confirmed that socio-economic status plays a larger role than any other social variable in aspiration: being a member of one of the two lower social classes is the single greatest social predictor of aspiration, and being a member of the lowest social class strongly predicted deletion.

Similar trends in aspiration and deletion were found in the production of syllable and word-final /s/ by Colombian speakers of Spanish in Lafford (1986). The study,

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<sup>4</sup> VARBRUL is a model of probabilistic analysis. The program generates the probabilistic weight that each factor contributes in a variable rule system. In general, a VARBRUL weight of greater than 0.50 indicates that a given variable rule is favored, while a weight of less than 0.50 indicates it is disfavored. For further information, please see Cedergren and Sankoff (1974), Tagliamonte (2006), and Pierrehumbert (2006).

which utilized data gathered in the coastal city of Cartagena in 1978, analyzed the effectiveness of each variation of the /s/ as a marker of social class, age, and style. The sibilant variant [s] was most common in the speech of the upper classes, while highest rates of deletion (phonetic zero) were observed in the lowest classes. For all socioeconomic groups, the most formal styles produced a larger proportion of [s] as compared to informal styles, while informal styles were favorable conditions for the phonetic zero. As Lafford notes, these findings support the proposal that the [s] is the most prestigious variant, common in formal styles and associated with high social standing, while phonetic zero is the more stigmatized variant, associated with lower social position, and most prevalent in informal styles. Data is less conclusive for the aspirated variant [h]. While instances of the [h] decrease as formality increase, its rate of use among social classes is similar enough for Lafford to propose that this variant, the most neutral of the three, is not strictly associated with any social group, nor does it convey a consistent level of prestige or stigma.

In terms of age, older subjects (ages 50+) in Lafford's (1986) study showed the highest propensity to produce the [s]. In combined results for the spoken styles (spontaneous and semiformal styles), older subjects used [s] 30% of the time, compared to 24% for both the median age group (ages 25-49) and the younger age group (ages 14-24). Lafford (1986) concluded that [s] and phonetic zero could be considered social markers with “moderate” effectiveness, while [h] could not be considered as such, due to a lack of strong correlation between use and social class.

Lafford's (1989) later analysis of the same data showed divisions according to socioeconomic status at a statistically significant level. While speakers from both lower

and upper classes did retain the full /s/ at least some of the time (lower class, 18%; upper class, 33%), the lower class speakers produced the deleted variant in 59% of instances of word-final /s/, while the upper class did so only 35% of the time. The upper class speakers used the aspirated variant more than the lower class speakers (32% and 23%, respectively).

The same general pattern follows in the Spanish of the Dominican Republic as documented by Alba (1990). In his analysis of /s/ as a plural marker, upper income speakers had relatively similar rates of aspiration and deletion (41% and 48%, respectively) and a low rate of retention (10%), while lower-income speakers favored deletion (92%) over aspiration (4%) and retention (4%). The middle-income speakers in the study were the most likely of all groups to retain the /s/ (19%), but tended to delete (60%) more than aspirate (21%). The percentage of deletion by both men and women was larger than the combined totals for aspiration and retention, with elision occurring in 61% of the cases for women and 76% of the cases for men. The next highest percentages for both groups were with aspiration, the women aspirating 24% of the time and men aspirating 14% of the time. The least popular variant was retention of the sibilant, but, as in other studies, women retained the sibilant at a greater rate (15%) than men (10%).

Fontanella (1973) found that the variable of speaker sex most clearly indicated the variable production of syllable-final /s/ in her participants from six occupational groups in Bahía Blanca, Argentina. Among the 60 participants, the 30 women showed rates of sibilant retention higher than the 30 men across all four styles (spontaneous interview, formal interview, reading a text, and reading a word list) and for all occupational levels. In some instances, women's rates of sibilant retention for a given style matched or

exceeded men's rates on a style higher on the formality continuum. This was the case in the women's "formal interview" style, with 87% retention of the sibilant, compared to men's text reading style, with 74.5% retention, as well as for the women's text reading style (90% retention), which matched the men's most formal style (word list reading, 90% retention). Fontanella notes that a more careful articulation of this variable can be considered a general characteristic of women's speech for the Bahía Blanca area, and that this corresponds to previous findings in other varieties of Spanish and other languages: women's speech tends to be more conservative and follow local prestige norms, while men's speech is characterized by less standard forms. Fontanella concludes that the more careful production of the /s/ on the part of females in the Bahía Blanca study corresponds with the general preferences of females for prestige forms seen in other regions with Spanish and with English. As in other studies, there was a positive relationship between /s/ retention and formality of speech. As formality increased, so did the rate of production of the sibilant. Similarly, higher occupational level corresponded with higher /s/ retention, even in the most spontaneous speech style.

Terrell (1979) analyzed the speech of middle class speakers from Havana, Cuba, who had had recently arrived in Miami. He concluded that the norm for educated middle class speakers in his study is aspiration, in 61% of total cases, while deletion was found to occur about 21% of the time and the sibilant 18% of the time.

Data from Puerto Rico follows a similar pattern as in other regions above. Terrell (1978) provides data on the upper sociolect of San Juan, and confirms a norm of aspiration (89%), followed by 6% retention of the sibilant, and 5% deletion. A few years later, López Morales (1983) presented what is still the most comprehensive analysis of /s/

aspiration and deletion in Puerto Rico. He carried out interviews with 105 speakers from the San Juan metropolitan area, spanning social class and regions of the city. The standard variant [s] showed up in just 9% of possible cases, followed by the deleted form in 38.2% of cases. The favored variant overall was the aspirated ([h]), appearing 51.1% of the time. Social class was a predictor of aspiration: as a speaker's sociocultural level decreased, the propensity for aspiration increased. In a slight shift from data from other regions, aspiration was slightly more probable if the speaker was a man or from the younger generational groups. As with Cedergren's data, age of arrival in the city was another predictor of aspiration, with speakers who moved to the city from a rural area after 12 years of age favoring aspiration.

In terms of deletion, the sociocultural/class distinction was again an important factor in López Morales (1983), with the lower class most likely to delete. There was a slight difference between genders, with men favoring deletion more than women. In the case of deletion, age of arrival also made a difference, with speakers of rural origin who came to the city after 12 years of age disfavoring deletion. López Morales concludes that of all social factors, the lower sociocultural class and masculine sex promotes deletion, although sex is not as vigorous a promoter as class (75).

Cameron (2005) reported similar trends in his examination of the Spanish of San Juan. The study, based on data collected in 1989, found that males, in general, favor deletion for word-final /s/. Females, in general, favor the sibilant [s] and aspirate [h]. However, age seems to make a difference: in the middle age group (40-60 years old), men actually have a higher probability of using the sibilant than women. This difference, Cameron (2005) proposes, is due to the "zigzagging" level of sex segregation across the

lifespan; for example, during middle age, males and females have the least amount of sex segregation, and for this reason, rates of aspiration and deletion become more similar. Although not all of the author's hypotheses were confirmed in the investigation, the idea of gender differences impacting social variation throughout the lifespan remains an intriguing area for future study.

More recently, Valentín-Márquez (2006) investigated the spoken Spanish of Cabo Rojo, a city in southwest Puerto Rico. The glottal stop in pre-vocalic word-final context was the focus of his investigation, but he found that the aspirate [h] was most common in word-final prevocalic contexts in the data overall (62%), followed by the sibilant (19%) and the phonetic zero (10%). This contrasts with the data for word-final prevocalic contexts presented by López Morales (1983), who found nearly equal amounts of aspiration and deletion (41%) in speakers from San Juan. The difference in results may be partially due to differences in the samples: Valentín-Márquez included adolescents in his analysis, while López Morales did not, and López Morales included young adults and Valentín-Márquez did not. In addition, Valentín-Márquez suggests that the difference might be a sign that deletion in Puerto Rican Spanish is diminishing in favor of aspiration. Furthermore, he suggests this *efecto refrenador* 'braking effect' may be caused by recent demographic changes, as Puerto Ricans seek to differentiate their speech from immigrants from the Dominican Republic, a dialect in which /s/ deletion is even more widespread. While the work of Valentín-Márquez suggests deletion may be diminishing in Puerto Rican Spanish, the point relevant to the current study is that phonetic zero is still the most stigmatized variant of the [s], [h], and phonetic zero trio, as documented in other studies.



From this discussion it is clear that there is variation in aspiration and deletion, and it has been shown to correspond to different aspects of social identities, including gender, age, socioeconomic status, and origin. We also see that deletion and aspiration of /s/ are most common in non-formal speech and use of sibilant ([s]) occurs most commonly in formal speech.

### **2.5.3 Linguistic influences**

While social variables predict proclivity towards aspiration or deletion, linguistic features influence production as well, and can limit the context in which it occurs. In her exploration of Colombian Spanish, Lafford (1989) illustrates this point by noting that "higher education or social status does not seem to affect the types of constraints (grammatical-functional or phonological) that speakers use to delete /s/" (p. 53). In other words, while production varies according to social categories, the grammatical-functional and phonological rules that govern that production are relatively stable across social groups.

These governing principles may be stable, but the interplay of factors is complex. Because of this, /s/ aspiration and deletion have been analyzed from a wide variety of viewpoints, taking into account many different grammatical-functional and phonological variables, including the location of the /s/ within the word, the surrounding phonetic context, the presence of stress, position within a string, word length, grammatical category, total syllables in the word, total syllables in an utterance, and the monomorphemic status of a word in which it appears. As with social variables, patterns vary by region, and there are, of course, exceptions to the general trends found across aspirating and deleting dialects (López Morales, 1983). In the following review, I detail

four of the most well documented variables: phonological context, word position, the presence and location of stress, and monomorphemic status.

Aspiration and deletion are influenced by the sounds that precede and follow the /s/. Cedergren (1978) focuses on the word-final /s/ in Panama, analyzing it in three phonological contexts: across the word boundary before a word-initial consonant, across the word boundary before the a word-initial vowel, and word-finally before a pause. In the corpus of 22,167 cases, the underlying word-final /s/ before a consonant (\_C) resulted in production of the sibilant [s] only 5% of the time, and was aspirated 45% and deleted altogether 50% of the time. The three variants had somewhat more even distributions in the case of word-final /s/ followed by a vowel (\_V), with approximate production rates of [s] 20%, [h] 30%, and phonetic zero 49% of the time. Finally, when the word-final /s/ was followed by a pause (\_P), the sibilant was found in 34% of the cases, the aspirated form in just 16% of the cases, and the phonetic zero in 50% of the cases. In other words, the most favorable context for the word-final /s/ to be fully retained was before a vowel and before a pause, while the most favorable for aspiration was before a consonant. There was no clear contextual favorability for the phonetic zero, as it occurred at a rate very near 50% in all contexts.

López Morales (1983) found similar overall trends in Puerto Rican Spanish. Since López Morales presents the most comprehensive data about how the phonetic context influences /s/ variation in Puerto Rico and is therefore highly relevant to the current study, a summary of his findings is provided in Table 2.1. As noted above, in all cases where an /s/ could be found (word-internally and word-finally, in all phonetic contexts), the [h] occurred most (51.1%), followed by the phonetic zero (38.2%) and the

[s] (9%). In word-internal, syllable-final context, before a consonant (for example, in the case of *esto*), there was a strong tendency for aspiration (80.8%), followed by deletion (11.6%) and the full sibilant (7.4%).

In overall word-final context, whether at a word boundary or before a pause, deletion is the most common variant, found in 46.5% of cases, but is followed closely by aspiration, at 43.8%. The sibilant ([s]) occurs 9.6% of the time. In specific word-final contexts, the proportions of aspiration and deletion change, but the rates of sibilant retention are always the lowest. The word-final /s/ before a word that begins with a consonant (across a word boundary) was most often aspirated (55.1%), then deleted (39%), and produced as [s] 5.8% of the time. Before a word beginning with a vowel, aspiration and deletion rates were very similar (41.3% and 40.7%, respectively). The [s] appeared more often before a following vowel than in any other word-final context, 17.9% of the time. The word-final /s/ before a pause was deleted 69.2% of the time, aspirated 20.1% of the time, and retained 10.5% of the time. In other words, in the López Morales (1983) Puerto Rican data, aspiration is the most common variant in most contexts except for word-finally before a pause. However, the proportions do differ between contexts. There is such a difference between aspiration and deletion in the word-final, pre-pausal context (aspiration 20.1% and deletion 69.2%) that the overall picture for word-final /s/ variation actually shows that deletion is the most common variant in word-final context in Puerto Rican Spanish.

López Morales' (1983) statistics for word-final deletion do differ from those found by Cedergren (1978). As mentioned above, deletion in the Cedergren (1978) data was very similar across all phonetic contexts (across word boundaries preceding

consonant or vowel, and before a pause). There were larger differences for word-final deletion according to context in López Morales' (1983) data, with deletion occurring 69.2% of the time when followed by a pause, but occurring 40.7% of the time when before a vowel, and occurring 39% of the time when before a consonant.

	Overall (full corpus)	Word- internally	Word-finally			
			Before Consonant	Before Vowel	Before Pause	Word- final overall
Sibilant [s]	9%	7.4	5.8	17.9	10.5	9.6
Aspirated [h]	51.1	80.8	55.1	41.3	20.1	43.8
Deleted	38.2	11.6	39	40.7	69.2	46.5

Table 2.1. Summary of /s/ variation in San Juan, Puerto Rico (López Morales, 1983).

In those cases where the word-final /s/ is followed by a vowel across a word boundary, variability in /s/ production is also influenced by the presence of stress. Data from López Morales (1983) show that the presence of a stressed versus unstressed vowel increases the chances that the /s/ will be retained. In his data, 27.7% of cases of /s/ before a stressed vowel at the word boundary were produced with the sibilant, versus 13.3% of cases before an unstressed vowel. Stress did not make as large of a difference in the case of aspiration and deletion, where the aspirate occurs 43.7% of the time across a word boundary before an unstressed vowel and 36% of the time across a word boundary before a stressed vowel; the deleted variant occurs 42.9% across a word boundary before an unstressed vowel and 36.1% across a word boundary before a stressed vowel. Other studies report similar rates of the effect of stress for Caribbean dialects, especially for retention of [s]. Terrell (1978) found [s] produced 16% of the time in the prevocalic unstressed environment and in 45% of the prevocalic stressed environment. In other words, the presence of stress has the most significant effect on retention of the sibilant;

rates of aspiration and deletion do not show as much variability due to the presence of stress.

The status of /s/ as a morpheme (as a marker of the second-person singular or of a noun plural, for example, *los zapatos, nuestras, sabes*) or as part of a monomorphemic word (with the /s/ not carrying any grammatical weight, for example, *mes, después, mientras*) is another feature that has been thought to influence /s/ aspiration and deletion. Kiparsky's (1972) Functionalist Hypothesis predicts that phonological segments that are grammatical markers will be preserved in speech. Results of different studies of /s/ aspiration and deletion in Spanish both support and contradict the hypothesis. Ma and Herasimchuk (1971) found that grammatical status did influence the use of the [s] in their data from Puerto Rican speakers in Jersey City. Terrell's (1975) data from Cuban speakers (Havana natives recently arrived in Miami) showed aspiration rates to be nearly equal in monomorphemic or grammatical situations, but that deletion occurred slightly more in cases of grammatical marking than in cases where it was part of a monomorphemic word. He concluded that deletion was constrained by a functionalist condition in the case of plural/singular contrasts in noun phrases, but not in other grammatical categories. Terrell's (1979) study of the upper sociolect of San Juan, Puerto Rico, reported that retention of the sibilant reached 23% in monomorphemic situations and only 20% when it was a grammatical marker, and deletion was actually higher in cases where the /s/ held grammatical status (37%), and lower in other cases (30%). In his study of Puerto Rican speakers in San Juan, López Morales (1980) found that there is no significant difference in the rate of retention, aspiration, or deletion between word-final /s/'s that can be correlated to its use as a grammatical/plural marking or to its presence in

a monomorphemic word. Lafford (1989) reported that grammatical-functional factors do not significantly influence deletion of word-final /s/ in Cartagena, Colombia, and similar results were found by other studies of aspiration and deletion, such as Alba (1988) in Santiago de los Caballeros, Dominican Republic. Poplack (1980) collected data on Puerto Ricans in a Philadelphia working-class neighborhood. She reported on plural /s/ markings in noun phrases, with emphasis on how disambiguation between plural and singular forms occurs. She found that when additional plural information is present (whether syntactic, morphological, semantic, or a combination), deletion is favored. When the only possible plural marking is inflectional and in the noun phrase itself, a marker (either [s] or [h]) is retained. Hochberg (1986), who studied the speech of a group of working-class Puerto Ricans in Boston, considered how subject pronouns may compensate for /s/ deletion. She found that the speakers in her study did have a higher rate of subject pronoun expression with verb forms that became ambiguous when the /s/ was deleted.

From our examination of Spanish /s/ variation, we see that /s/ aspiration and deletion varies from context to context, but follows a relatively stable pattern of social variation that is further delimited by linguistic factors. Full retention of the sibilant ([s]) is associated with higher socioeconomic status, female speakers, careful or formal speech, and is most likely to occur, when it occurs at all, before a vowel or pause. The sibilant's occurrence in Puerto Rico and the other dialects mentioned is superseded by both aspiration and deletion. While deletion is documented in all classes, it becomes more common as socioeconomic status lessens; aspiration becomes more common as

one moves up the SES continuum, and seems to be favored slightly more by women than men.

## **2.6 Summary**

This chapter has presented a review of literature that discussed a number of approaches to investigating sexual orientation and phonology, suggested priming techniques as a tractable method for study of the issue, and presented the case of /s/ aspiration and deletion as a possible marker of identity to be examined therewith. Taking into account the previous work done in all these areas, three experiments were designed and formed the dissertation project. Experiment One, an interview task, documents the conscious speech stereotypes associated with sexual orientation and other social categories. It is detailed in the Chapter Three. Experiment Two is an explicit measures perception task. It focuses on relationships between acoustic factors and perception of sexual orientation, and examines the variability of listener ratings. It is reported in Chapter Four.

Experiment Three, detailed in Chapter Five, evaluates whether response times in a voice recognition task are influenced by the type of /s/ in the stimuli and the speaker's perceived sexual orientation. It also evaluates whether these variables interact in a way that suggests that listeners expect different types of /s/ for speakers whose voices have differences in their perceived stereotypicality according to sexual orientation. The hypothesis is that voices will be recognized faster and more accurately when there is a match between the perceived sexual orientation of the speaker and the presence of absence of [s], and that this effect will be most readily observable in a situation where

listeners are led to believe that the variation in the speakers' voices is due to differences in sexual orientation.



## Chapter 3

### Experiment One

#### Interviews on speech stereotypes and social categories<sup>5</sup>

##### 3.1 Overview of the experiment

This experiment was developed as a method to establish that the participants in the listening tasks (Experiments Two and Three) were familiar with a stereotype associated with gay men's speech. Its other purpose, related to this dissertation's larger question of sociophonetic variation and social identity, was to gather systematically collected data on conscious speech stereotypes according to sexual orientation. As mentioned, there is little systematically collected data on phonetic variation and sexual orientation, and most of the anecdotal evidence that does exist refers to male effeminacy rather than sexual orientation. So, in order to provide data on the larger question of socioindexicality and perceptions of sexual orientation, these data were analyzed with several goals in mind. One goal was to document the existence of a conscious speech stereotype associated with male sexual orientation. Although it is evident from anecdotal evidence that there is a shared notion of speech variation related to gay male speech at a societal level (and, indeed, the dissertation depends on this notion), it is nonetheless useful to document its existence through an analysis of systematically collected data. The second goal was to document what specific patterns of variation are implicated in the speech stereotype associated with gay male speech. Since there are no known studies that have elicited production data on gay men's speech considering phonetic or phonological variables in Spanish, knowledge of the specific elements that make up the stereotype, along with what

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<sup>5</sup> Portions of this chapter appear in Mack (2008).

phonetic variation carries socioindexical weight, will be very helpful in the design of future studies, as well as to the interpretation of the results of the main study of this dissertation.

### **3.2. Methods**

There were 88 interviewees (58 female, 30 male) who ranged from 18 to 30 years of age. Participants included listeners from both experimental tasks as well as talkers who recorded the stimuli. The duration of the interviews ranged from five to 25 minutes. In the interviews, participants were asked to reflect on speech stereotypes related to five social classifications: age, gender, male sexual orientation, social class, and the existence of a regional variety of Spanish specific to Puerto Rico. To analyze the data, the transcribed responses were reviewed and main group-wise trends in the data were coded.

### **3.3. Analysis and Results**

**3.3.1 The existence of a stereotype associated with gay male speech.** Since there is little systematically collected data on stereotypes of speech and male sexual orientation, it is important to note that the existence of a stereotype of speech and male sexual orientation was verified by all 88 participants. In other words, no participant rejected the notion that a stereotype of speech and male sexual orientation exists. One participant phrased it quite succinctly:

(1)

Participant 323, female: *El estereotipo, y lo hay, es que el hombre homosexual habla de una manera extremadamente afeminada.*

‘The stereotype, and there is one, is that the homosexual man speaks in an extremely effeminate way.’

The existence of a stereotype was not as clear in participant responses to the other interview questions; several participants stated there were no speech stereotypes corresponding to social classes, and several interviewees felt there was no stereotype of speech variation according to gender (e.g., that there were no differences between men's and women's speech). A possible explanation for this may be that a part of the gay male speech myth is that gay men are identifiable by their speech; as a key part of the myth, it is consciously known and therefore reportable. Myths about gendered speech, on the other hand, don't seem to entail the same degree of conscious acknowledgment of identification or differentiation, perhaps because differentiation is achieved in other ways. For example, several interviewees told stories of being surprised to find out that a friend or associate was gay, because they didn't "sound gay." In contrast, no participant reported surprise at finding out a friend was male or female based on how they "sounded;" identification of gender does not seem to have the same kind of conscious relationship to stereotypes of speech variation that sexual orientation does.

While participants acknowledged that a stereotype of speech and gay male speech exists, 54 of the interviewees (approximately 60%) explicitly mentioned that the stereotype of gay men's speech does not correspond to real world (experienced) variation, and that it is difficult to generalize among gay males. For example:

(2)

Participant 203 (female): *Es que depende porque dentro de los gays uno también puede dividir en diversas clases. Están los gay profesionales, también los gays como locas, ¿no? Y entonces, también entre ellos tú lo puedes diferenciar.*

‘It’s that it depends because within gays one can divide them into different groups. There are the gay professionals, also the gays that are like queens, right? And so, you can differentiate between them also.’

(3)

Participant 508, male: *El estereotipo en cuanto al habla del hombre gay se tiende a pensar que por el simple hecho de que un hombre sea gay tiene que ser afeminado o tiene que mostrar ciertos manierismos o tiene que hablar como mujer. O algo parecido. Y yo soy de los que está en contra totalmente de eso. No necesariamente tiene que ser así. El hombre que sea gay o que tiene esa orientación sexual, pero sigue siendo hombre.*

‘The stereotype in terms of gay men’s speech one tends to think that because of the simple fact that a man is gay he has to be effeminate or he has to show certain mannerisms or he has to talk like a women. Or something like that. And I am one of those [people] who is totally against that. It doesn’t necessarily have to be this way. A man might be gay or have this sexual orientation, but he is still a man.’

(4)

Participant 320, male: *Pues sí, dicen que los gays tienen que hablar de una manera específico, como más afeminado que otros. Yo te confieso, yo soy gay, soy homosexual y por lo menos mi voz no...yo la considero varonil como cualquier otro hombre. O sea, que eso, como dicen, es un estereotipo.*

‘Well, yes, they say that gays have to talk in a specific way, like more effeminate than other [men]. I confess, I am gay, I am homosexual and my voice, at least,

does not...I consider it as manly as any other man. Or, as they say, it is a stereotype.’

(5)

Participant 302, female. *Sí, hay un estereotipo, sí. Bueno, primeramente lo que se considera gay, por ejemplo, solamente aplica como a estas personas que son dramáticamente gay. No sé, aquí se les llama por ahí, locas. Que no es realmente el único tipo de homosexual, ¿no? Que son diferentes, no es como que tú los puedas encajonar en una sola categoría. Y esa categoría es la que tiene... o sea, esa es la categoría que se estereotipa como gay, ¿no?*

‘Yes, there is a stereotype, yes. Well, what is primarily considered gay, for example, only applies to those people who are dramatically gay. I don’t know. Here they’re called *locas*. Which is not really the only type of homosexual, right? They are different, it’s not like you can box them into one category. And this category [of *locas*] is the one that has, well, this is the category that is stereotyped as gay, right?’

The conscious distinction between stereotypes and real world linguistic experience was not present in responses to the other questions on stereotypes of gender, social class, age, and region of origin. Few participants made explicit distinctions between a stereotype and real world (experienced) variation; a more common reply was one like example (6), below, in which the participant acknowledges that there are societal expectations of men and women in terms of their speech, but makes no mention that there is a difference between the expectations or behaviors and real world practice:

(6)

Participant 304, female: *En Puerto Rico, sí, yo entiendo que los hombres tienden a ser un poco más bruscos en su manera de hablar. Tienden a usar palabras un poco más fuertes. Puede ser hasta que hablen palabras malas, más que las mujeres, usualmente es lo que pasa. Mientras que las mujeres tienden a ser más delicadas, me imagino que es lo que la sociedad espera de ellas. Tienden a usar palabras más finas. Y usualmente es lo que yo entiendo que las personas esperan que sean. Que ellos esperan que las mujeres sean más delicadas mientras que los hombres sean más rough, ¿entiendes?*

‘In Puerto Rico, yes, as I understand it men tend to be a little brusquer in their way of talking. They tend to use a little bit stronger words. It could be that they use bad words, more than women do, usually that is what happens. Women tend to be more refined. I supposed that it is what society expects of them. They tend to use nicer words. And usually it is, as I understand, what people expect them to be.

They expect that women be more refined while men are rougher, you understand?’

Why is it that participants made the distinction between real world experience and the stereotype for gay speech and not for other social categories? As in the case of acknowledgement that a stereotype exists (above), it seems that it is possibly because stereotypes of gay speech are a conscious element of the larger stereotype of male sexual orientation. Another possible explanation, related to the previous, is that there is a heightened awareness of GLBT civil rights and discrimination, especially among people in the younger generation who participated in this study. In Puerto Rico, as in other Western contexts, there have been recent conflicts between gay rights groups and those

opposing equal rights. In 1998, Puerto Rico ratified the Defense of Marriage Act; in 2005, homosexuality was decriminalized and the University of Puerto Rico prohibited discrimination based on sexual orientation. Hearings on a same-sex marriage ban began in 2007, and in June 2008, Puerto Rico's House of Representatives rejected a proposal to ban same-sex marriage (Lavers, 2007). The data for this study was gathered in Fall 2007 and Spring 2008, so it is possible that respondents may be aware of the distinction (and may be careful to state there is a distinction) because GLBT issues are part of the current public consciousness. There may be a critical assessment of stereotypes of gayness in general, and there also may be a desire on the part of the interviewees to project a certain image to the interviewer.

### **3.3.2 Specific patterns of variation implicated in the stereotype: indexical cues?**

The second goal of this analysis was to determine what specific patterns of variation are implicated in the speech stereotype associated with gay men. Although the exact descriptive words varied by respondent, the greatest point of uniformity in responses was that an essential element of the stereotype of gay men's speech is that it is "feminine." Representative examples of this are found in quotes (1), (3), and (4), above, and (9) and (23), below. This finding parallels the available data on speech and sexual orientation that exist in the linguistic literature such as Sívori (2005) and Peña (2004), as discussed previously. While the conscious stereotype links gay male and (presumably heterosexual) women's speech patterns, perception studies in languages other than Spanish suggest that the acoustic factors that cue evaluations of gender and sexual orientation are not the same (Munson and Babel, 2007). In addition, the data that is

available from production studies shows little evidence of acoustic correlates between gay men and straight women's speech (Munson et al., 2006; Pierrehumbert et al., 2004).

Beyond the general pattern of linking gay male speech stereotypes to women's speech stereotypes, participants cited more specific elements as central to the stereotype. These elements can be organized into five main categories: a distinct tone of voice and/or "pitch," the use of specific words or slang, careful or "better" pronunciation, specific gestures or mannerisms, and phonetic realization of specific phonemes. It must be noted that in many cases the interviewees listed several different elements, so there was overlap between the categories. The specific factor mentioned by the largest share of participants was categorized as "tone of voice," "pitch," and "intonation." This was mentioned specifically by 39 of the 88 participants. The following are representative examples:

(7)

Participant 312, female: *En la tonalidad es más afeminado, trata de afinar más la voz, como que arrastra más, como que "ayyyy." Como que esos son estereotipos que se tiene, yo estoy consciente que no todo el mundo. Y también mucho en los gestos, no tan solo en lenguaje. Más corporal y eso.*

'In tonality it's more feminine, [a gay man] tries to refine his voice more, like he drags it out more, like *ayyyyy*. As these are stereotypes that are held, I am aware that it's not everyone. And also [it is notable] in gestures, not only in language. More body language and that.'

(8)

Participant 327, female: *Si el tono es más finito, pues dicen que es gay. Aunque no lo sea.*



‘If the tone is more refined, then they say he is gay. Even if he isn’t.’

(9)

Participant 306, female: *Tienden a afinar más la voz para ser más mujeres o para ser más delicados; que engolan la voz.*

‘[Gays] tends to refine their voice to be more like women or to be more genteel; they put on an affected voice.’

(10)

Participant 323, female: *Que habla en tonos más altos. Porque un tono más alto denota un cierto rango de feminidad.*

‘[The stereotype is] is that a gay man speaks with a higher tone. Because a higher tone denotes a certain level of femininity.’

In this case, the respondents link the “tone of voice” of gay men to female speech. Although the popular notion of “pitch” or “tone” is not perfectly mirrored by the technical F0 measurement, it is the closest corresponding single factor. Many studies have documented the role of mean F0 as a “very robust cue for distinguishing male and female adult voices” (Smyth and Rogers, 2002, p. 303). However, available data from other languages has not shown similar effects in terms of perception of sexual orientation; in other words, mean F0 alone has not been documented as a cue for distinguishing between “gay sounding” and “straight sounding” adult male voices (Gaudio, 1994; Smyth and Rogers, 2002). As we will see in the following chapter, it was not a significant cue to perceived sexual orientation for the participants in this study protocol. Nonetheless, the interview data indicate it is part of the conscious speech stereotype.

Another element of the stereotype mentioned by many participants (36 total) was that gay men tend to use specific words, phrases, or slang, as in the following examples:

(11)

Participant 322, female: *Que [el hombre gay] diga palabras que usualmente solo usarían mujeres como “ay, nena”, “qué lindo”, “qué bello”...*

‘That [the gay man] uses words that usually only women would use like “oh, little girl”, “how pretty”, “how beautiful”...’

(12)

Participant 305, male: “...están los extravagantes que son, ‘¡Ay! ¡Cosa loca!’”

‘...there are those that are extravagant, that are like, “Wow, crazy thing!”’

(13) Participant 502, female: *Y si usan una palabra como femenina, como aquí pasa mucho, dicen “ay, nena, pero no te preocupes”, ese “ay, nena” es básicamente de nosotras y si lo usa un varón es rápido como que él yo creo que esta extendiéndose por otro lado.*

‘And if they use a word like feminine, like happens a lot here, they say “oh, little girl, don’t you worry”, that “oh, little girl” is basically from us [women] and if a man uses it, it’s quick that I think that he is on the other side.’

(14)

Participant 309, male: *[Los hombres gay] utilizan palabras como “bonito”, “fabuloso”, ese tipo de palabras. Utilizan esas palabras porque tienen más libertad de expresar lo que sienten, y el hombre [estaight] no puede expresarlo...son palabras que no se usan, palabras afectivas mayormente.*

‘[Gay men] use words like “*bonito*”, *fabuloso*”, that type of words. They use those words because they have more freedom to express what they feel, and a straight man is not able to express it...they are words that are not used [by straight men], emotional words primarily.’

This finding mirrors previous work on the salience of lexical items as identity markers. As Trudgill (1986) notes, “lexical differences are highly salient, and are readily apparent to all speakers of the varieties concerned without any linguistic training or analysis” (p. 25). Indeed, most early analyses of gay language have focused on in-group terms (Kulick, 2000). In the case of this study, participants suggested that lexical items “normally” used by women are used by gay men, as in (11) and (13).

Another element of the stereotype that was mentioned by approximately one-third of participants (29 of 88) was that gay men are stereotyped as having more careful speech and/or “better” pronunciation. Some participants made general mention of “correct” speech (see example 15, below), while others make a specific link to phonetic variables, as in examples (16) and (17), below. [See also examples (18) and (24).]

(15)

Participant 104, male: *Y por ejemplo, en los programas de radio, cada vez que un hombre habla correcto, piensan, le dicen que es gay...*

[And for example, in radio programs, every time a man speaks correctly, they think, they say that he’s gay...’

(16)

Participant 211, female: *[Los hombres gay] no eliminan algunas consonantes como los hombres heterosexuales.*

‘[Gay men] don’t eliminate some consonants like heterosexual men.’

(17)

Participant 332, male: *[Los hombres gay] tratan de pronunciar hasta las "s", tratan de pronunciar todo.*

‘[Gay men] try to pronounce even the “s’s”, they try to pronounce everything.’

There is correspondence between this specific element of the stereotype and work done on perception of sexual orientation in other languages. Studies in English document that gay men are evaluated as more clear-sounding than straight men (Munson et al., 2006); in addition, Babel and Johnson (2006) report that evaluations of reading ability were correlated to evaluations of sexual orientation, with good reading ability corresponding to sounding gay. Although interviewees did not link careful speech to “feminine” speech in the same explicit way they did for “tone of voice” and lexical items, the sociolinguistic literature supports a link from the production perspective. As Milroy and Milroy (1997) note, “females tend toward the careful end of the continuum and males toward the casual end.”

Specific gestures and/or mannerisms were cited as another key element of the stereotype, mentioned by a little over a quarter of the participants (23 of 88). Illustrative examples are (7), above, and the following:

(18)

Participant 101, male: *Bueno, siempre tiene el estereotipo de que el hombre gay habla súper bien. O sea, que pronuncia todas las letras, que tiene un rico vocabulario. Pero es que no solamente es la forma en que habla sino los gestos, la extravagancia, como dicen por ahí.*

‘Well, there is always the stereotype that the gay man speaks really well. Or rather, that he pronounces all the letters, that he has a rich vocabulary. But it is not only the way in which he talks but also the gestures, the “extravaganza”, as they say around here.’

(19)

Participant 332, male: *Y la forma en que se expresan también corporalmente cuando hablan.*

‘And in the way in which [gay men] express themselves in body language when they talk.’

There were also comments that specifically singled out certain phonetic variables. Sixteen participants cited one or more specific phonetic variants as elements of the stereotype. The single phonetic variable cited most (by 8 of the 16 participants that cited any specific phonetic variant) was realization of the /s/. This is illustrated in (17), above, and in the following:

(20)

Participant 203, female: *La “s”, lo he notado mucho, como que [los hombres gay] tratan de hacer una pronunciación más correcta, creo yo.*

‘The “s”, I have noticed it a lot, like [gay men] try to do a more correct pronunciation, I think.

(21)

Participant 302, female: “...reponen más “s”...”

‘They put the “s” back in more.’

(22)

Participant 322, male *“Y como que a veces [los hombres gays] hasta arrastran la “s”. Me ha pasado mucho porque tengo bastantes [amigos gays] como que... “Porque mira pues” y como que siempre hace mucho más fácil la “s”. Tengo algunas amistades que son, pues homosexuales y siempre hacen eso.”*

‘And like sometimes [gay men] even drag out the “s.” It has happened to me a lot because I have quite a few [gay friends] that are like *“Porque mira puesss”* and the “s” is always made much better. I have some friends that are, well, homosexuals and they always do that.

(23)

Participant 346, female: *“...como que por lo menos las "s" o las "c" hacen así, como que las pronuncian mucho.*

‘...like at least the “s’s” or the “c’s” they do like this, like they pronounce them a lot.’

(24)

Participant 502, female: *Hay unos [gays] que afinan la voz y tratan de hablar bien correcto y bien femenino, las “s” y todo.*

‘There are some [gays] that refine their voice and try to speak real correct and real feminine, the “s” and all.’

(25)

Participant 512, female: *...pronunciando las "s" un montón, tú sabes.*

‘...pronouncing the “s” a lot, you know.’

Clearly, these findings are important to the primary task of the dissertation, and provide further support of Zentella's (2003) statement (above) about the perception of the socioindexical value of the sibilant [s] in aspirating and deleting dialects. They also correspond with the numerous production studies that identify /s/ realization as a variable use that has a high degree of social stratification. It suggests a link to feminine speech styles as well. In production studies, the use of sibilant [s] in Puerto Rican Spanish is correlated with women's and higher SES speech (López Morales, 1980, 1983). However, it should be noted that no participant noted /s/ variation as a differentiating factor when they were asked about stereotypes of men's and women's speech.

Four participants specifically mentioned nasality as an element of stereotype. For example:

(26)

Participant 304, female: *Lo que yo he visto usualmente con mi experiencia es que los hombres gay tienen la voz...tiende a ser más nasal.*

‘What I have usually seen in my experience is that gay men have a voice...it tends to be more nasal.’

(27)

Participant 324, female: *Y [los hombres gay] hablan hasta más nasal de lo que hablan las mujeres.*

‘And gay men talk even more nasal than women talk.’

Finally, three participants mentioned the /ɾ/ as an indexical cue, citing the “English r” retroflex approximate as the allophone of choice among gay men, according to the stereotype.

(28)

Participant 101, male: ...*como mujer* [mu.héɻ]...[*el hombre straight*] *no va a decir*: “*Ay, es que eso es una mujer* [mu.héɻ]

‘...like “*mujer*” [mu.héɻ]...[a straight man] isn’t going to say “*Ay, es que eso es una mujer*” [mu.héɻ]’

(29) Participant 104, male: *La “r,”*[*los hombres gay*] *siempre usan el “r”*  
[retroflex approximant, [ɻ]], “*mujer*” [mu.héɻ]

‘The “r”, [gay men] always use the “r”, “*mujer*” [mu.héɻ]’

The use of the retroflex /r/ is likely due to contact with English, and the perceived use of this variant by gay men may be due to the relative prestige of English in different social strata. For example, several respondents reported that one difference in stereotypes of SES is that higher SES speakers use more English words.

### **3.4 Discussion of Experiment One findings**

In addition to the primary goal of establishing listener linguistic awareness for the dissertation’s voice recognition experiment (Experiment Three), this task also sought to document the existence of a conscious speech stereotype associated with gay males and to identify what specific patterns of speech variation are implicated in it. Unsurprisingly, there was confirmation that a stereotype of gay male speech exists. More interestingly, a majority of respondents made a conscious distinction between the gay speech stereotype and real world linguistic experience; the same level of conscious distinction was not made for stereotypes of speech and gender, age, SES, or regional origin. As discussed earlier, this could be due to the heightened awareness of gay civil rights issues and the concurrent public debate. Regardless of the cause, this awareness mirrors the discussion



about “gay” language going on in the linguistic literature. There is increasing evidence from production studies that gay speech production depends not only on a speaker’s self-stated sexual orientation, but variables such as interlocutor, community of practice (Wong, 1999), and context (Podesva, Roberts, and Campbell-Kibler, 2001). Clearly the participants in the study understand that these variables play a role, and that there is no single pattern of variation that all gay men follow, even if a strong societal stereotype exists. This finding proved useful in the post-hoc interpretation of the other dissertation experiments’ results.

The task also found that the most-cited element of gay male speech stereotypes was that gay men speak in a “feminine” way. This corresponds to data from English attitudinal studies that show that gender ideals and gender stereotypes are utilized in stereotypes of sexual orientation (Kite and Deaux, 1987). The attitude also follows the implicit inversion model, a theory of sexuality proposed by Freud (1904, as cited in Kite and Deaux, 1987). Mainstream, dominant stereotypes of women and men become inverted for gay men and lesbian women. Outside of “feminine,” the specific elements associated with the stereotype include a distinct tone, pitch, or intonation, the use of specific phrases or slang, careful or “better” pronunciation, the use of specific gestures or mannerisms, and distinctive production of specific phonemes, including the /s/.

As mentioned earlier, the interviews took place at the same time as the other experiments in the dissertation project, so the interview data was not available ahead of time and did not influence the choice to examine /s/ variation in the study. Nonetheless, documentation of /s/ variation as part of the conscious speech stereotype is a positive confirmation of its perceived socioindexical value. As we will see in the following

chapters, these data were also beneficial in the interpretation of other experiments' results.

## **Chapter 4**

### **Experiment Two**

#### **Explicit measures of perceived social identity<sup>6</sup>**

##### **4.1 Overview**

The explicit measures perceived social identity experiment was developed as a method for evaluating the stimuli to be used in the voice recognition experiment (Experiment Three). Specifically, it established the perceived sexual orientation of each of the talkers. Its other purpose, related to this dissertation's larger question of sociophonetic variation and social identity, was to gather systematically collected data on listeners' perceptions of talker characteristics. The analysis reported in this chapter addresses three questions related to sociophonetic perceptions. First, it examines how uniformly Spanish-speaking listeners rate speakers' voices in terms of perceived sexual orientation. This is an important question for sociophonetic methods as well for the specific case of this study's main task. Insight into listener variation may be useful in post hoc analysis of the voice recognition data. Second, it examines what phonetic variation correlates with different evaluations of perceived sexual orientation for these study stimuli. Lastly, it examines the relationship between listener judgments of speaker sexual orientation and other perceived speaker characteristics.

##### **4.2 Methods**

###### **4.2.1 Participants**

The task was carried out in the same speech community as the other tasks in the dissertation project. It included 23 participants (five male, 18 female). All participants

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<sup>6</sup> Portions of this chapter to appear in Mack (forthcoming).

were native speakers of Spanish who had grown up in Puerto Rico and were undergraduate or masters level students at a large public university in the San Juan metro area. The mean age of the listeners was 22 years. All listeners reported at least basic knowledge of English; six spoke an additional language (other than Spanish or English), and six spoke more than one additional language. Each listener also completed the interview on speech stereotypes (detailed in Chapter 5). Listeners received \$10 for their participation.

#### **4.2.2 Stimuli**

The stimuli for the task were six article-noun phrases that were recorded for the voice recognition task (Experiment Three). They were:

el día '*the day*'

la vida '*the life*'

el tiempo '*the weather*' or '*the time*'

la gente '*the people*'

el mundo '*the world*'

la manera '*the manner*'

#### **4.2.3 Procedures**

The task was designed and delivered using *E-Prime* experiment management software (Schneider, Eschman, and Zuccolotto, 2002). During the perception task, listeners reported their evaluations of four different speaker variables: Age, height, social class, and sexual orientation. The experiment was made up of a series of 80 trials. In each trial, listeners heard the six short article-noun combinations produced by the same speaker. The phrases were presented onscreen as the recordings played. After listening

to the six phrases, listeners were presented with a question addressing one of the four variables. For age, listeners provided direct magnitude estimates of age in years. For height, social class, and perceived sexual orientation, listeners were presented with a five-point scale and entered the whole number (one through five) that corresponded to their evaluation. Each scale was developed in conjunction with trained linguists from the study community. For perceived height, “1” corresponded to much taller than average and “5” corresponded to much shorter than average; for perceived social class, “1” equaled higher social class and “5” equaled lower social class. In the scale for perceived sexual orientation “1” corresponded to gay, “2” corresponded to very gay, “3” corresponded to more or less gay, “4” corresponded to straight/heterosexual, and “5” corresponded to not gay or straight/heterosexual. This scale was developed in consultation with local linguists, and although it differed from the height and social class scales, it was selected as the most appropriate for local norms based on the opinions of the local informants. After the data were gathered the scale was normalized to be comparable with the height and social class scales. The presentation order of speakers and questions was randomized (i.e., the experiment was not blocked by question). The complete experiment text is included in Appendix A.

### **4.3 Analysis and Results**

#### **4.3.1 Uniformity of listener evaluations**

The first analysis aimed to determine whether or not Spanish-speaking listeners uniformly rate speakers’ voices in terms of perceived sexual orientation. A number of statistical techniques were used to examine this. First, a matrix of Spearman  $\rho$  correlations between the 23 listeners’ ratings and the 20 talkers’ perceived sexual

orientation was calculated. Approximately half of the listener pairs' correlations did not achieve statistical significance at the  $\alpha < 0.05$  level, suggesting that different listeners were indeed rank-ordering talkers differently. Second, a factor analysis was performed on the listeners' ratings of the talkers' perceived sexual orientation. Principle components extraction and varimax rotation were used. Six factors were extracted. An examination of individual listeners' loadings on the six factors showed that there were seven listeners in the first factor, five on the second, three each on the third, fourth, and fifth, and two on the sixth. Listeners that clustered together were the same as those that had been established as significantly correlated in the Spearman  $\rho$  correlation analysis. This suggests that there are distinct patterns of listener performance on this measure. Two Kruskal-Willis tests showed that these groupings were not due to differences across listeners in either the mean score that they gave to the 20 talkers, or in the standard deviation of their scores. The demographic data for each listener was also examined to see if there were links between speakers that might provide an explanation for the clustering pattern. However, there were few differences between clusters in terms of demographic information that was collected. The five men who took part in the study were spread throughout the clusters (two in one cluster, and the other three in separate clusters). Listeners in each cluster were similar in terms of language background, age, and level of education. We return to listener consistency and variation in ratings in Section 4.3.3.5 (below) by examining whether the clusters of listeners are based on variation in attention to different acoustic parameters in the stimuli.

### 4.3.2 Correlation among different social judgments

In order to address the relationship between listeners' judgments of speaker sexual orientation and other perceived speaker characteristics, a correlation analysis of listener evaluations of perceived sexual orientation, perceived height, perceived age, and perceived social class was carried out. A summary of these data is found in Table 4.1.

There was a significant relationship between perceived sexual orientation and perception of height,  $r = -.461$ ,  $p$  (two-tailed)  $< .041$ , with talkers rated as gay sounding more likely to be rated as shorter than talkers rated as straight sounding. There were no significant relationships between perceived sexual orientation and perceived age or perceived social class. However, perceived height was significantly correlated to perceived age,  $r = -.605$ ,  $p < .05$ , as well as perceived social class,  $r = .566$ ,  $p < .05$ , with speakers rated as taller sounding more likely to be rated as older sounding and from a higher social class.

Perceived age and perceived social class had a significant relationship,  $r = -.525$ ,  $p < .05$ , with speakers perceived as older also being perceived as being from a higher social class.

Subscale	1. Perceived Sexual Orientation	2. Perceived age	3. Perceived height	4. Perceived social class
(n = 23)				
1. Perceived sexual orientation	—	-0.29	-0.46*	-0.05
2. Perceived age		—	-0.61*	-0.53**
3. Perceived height			—	0.57*
4. Perceived social class				—

\*  $p < .05$  (two-tailed); \*\*  $p < .01$  (two-tailed)

Table 4.1. Correlation analysis of perceived sexual orientation, perceived height, perceived age, and perceived social class (Pearson's correlation coefficient).

### 4.3.3 Acoustic analyses

#### 4.3.3.1 Summary of acoustic data

Measurements of acoustic elements were made using Praat signal-processing software (Boersma and Weenink, 2003). The analysis included an examination of vowel characteristics including individual and mean F1 (Bark), individual and mean F2 (Bark), and individual and mean  $F_0$  of each stressed vowel (/e/ in *manera*, *tiempo*, and *gente*; /i/ in *vida* and *día*; /u/ in *mundo*) and the pretonic /a/ in *la manera*. Although /o/ appeared in the stimuli, all instances were posttonic and phrase-final, so it was not possible to interpret the acoustic characteristics as something unique to the talkers or to the fact that they were unintentionally sampled in that prosodic position. Estimates of speaker vocal tract length in cm were also calculated by measuring the F3 of pretonic /a/ in *manera* (treating it as if it had been produced by an unmodified vocal tract, and deriving vocal-tract length using the odd-quarter formula, Fant, 1966). Average vowel space expansion was also calculated, using the bark-scaled F1 and F2 values (following the formula found in Bradlow, Torretta, and Pisoni, 1996). A summary of the mean acoustic characteristics of the stimuli is found in Appendix B.

#### 4.3.3.2 Correlation between acoustic measures and social variables

In order to understand the role of the acoustic characteristics on listener evaluations of speaker sexual orientation, a correlation analysis between the listener evaluations of perceived sexual orientation and the acoustic data was conducted. The analysis showed a statistically significant correlation between perceived sexual orientation and F2 frequencies of two tokens of mid front vowels: /e/ in *la manera* ( $r = -.478, p < .05$ ) and /e/ in *el tiempo* ( $r = -.456, p < .05$ ). Higher F2 frequencies correlated to perception of a speaker as more gay sounding. There were no significant correlations



between perceived sexual orientation and individual F1 frequencies, individual  $F_0$  values, estimated vocal tract length, average dispersion, or for the F2 frequencies of /i/ (*la vida*, *el día*), /u/ (*el mundo*), or pretonic /a/ (*la manera*). Since this is an exploratory study, it is beneficial to note one relationship approaching significance, which was the F2 frequency for the remaining mid front token, /e/ in *la gente* ( $r = -.412$ ,  $p = .071$ ).

A correlation analysis of acoustic characteristics of individual vowels and listener evaluations of height, social class, and age showed several statistically significant relationships. Perceived height correlated with  $F_0$  values in pretonic /a/ of *la manera* ( $r = .681$ ,  $p < .01$ ), /e/ of *la gente* ( $r = .611$ ,  $p < .01$ ), /e/ of *la manera* ( $r = .617$ ,  $p < .01$ ), /e/ of *el tiempo* ( $r = .627$ ,  $p < .01$ ), and /i/ of *la vida* ( $r = .471$ ,  $p < .05$ ); speakers with lower  $F_0$  values were rated as taller sounding than those with higher  $F_0$  values. Perception of social class showed significant correlations with F1 values in three of the high vowels: /i/ in *el día* ( $r = .630$ ,  $p < .01$ ), /i/ in *la vida* ( $r = .648$ ,  $p < .01$ ), and /u/ in *el mundo* ( $r = .598$ ,  $p < .01$ ). In these cases, higher F1 frequencies (lower vowels) were correlated with speakers perceived as from a lower social class, and lower F1 frequencies (higher vowels) were correlated with speakers perceived as from a higher social class. Perceived age correlated with one acoustic measure,  $F_0$  values of /e/ in *la gente* ( $r = -.446$ ,  $p < .05$ ), with speakers with lower  $F_0$  perceived as older and those with higher  $F_0$  perceived as younger.

#### **4.3.3.3 Analysis by speaker groups**

The next analysis examined the patterning of individual and groups of talkers' F1 and F2 values in order to see whether the effect of F2 was driven by one particular vowel. In this case, the talkers were divided into three groups, most gay sounding, least gay

sounding, and intermediate, by examining talkers' mean perceived sexual orientation ratings. Data from this analysis is displayed in Figure 4.1. In this view of the data the differences in F2 of /e/ are evident. What is perplexing is the differences between groups in F1 frequencies, which in most cases seem to be greater than the differences between F2, but nonetheless were not found to have a significant relationship with evaluations of perceived sexual orientation. A possible interpretation is that the differences in F1 were immediately associated with something other than perceived sexual orientation. Data from the correlation analysis above suggests that the most likely association of F1 is with social class.

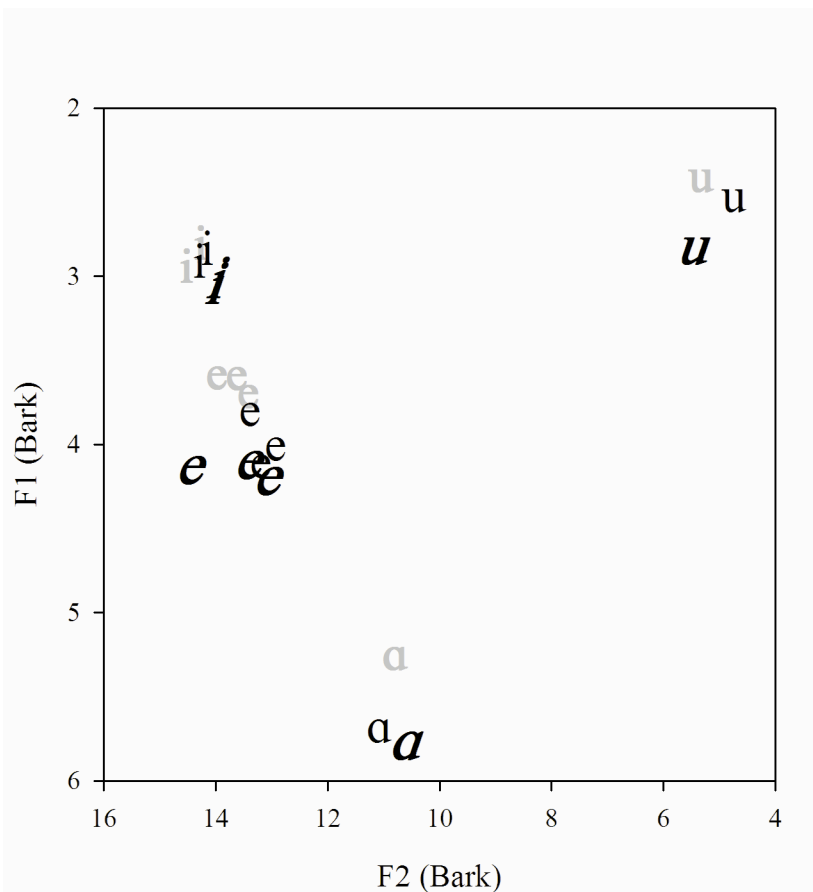


Figure 4.1. Group averages of vowel formant frequency by word, for talkers rated as most gay sounding (light gray), least gay sounding (plain text), and intermediate (italics).

#### 4.3.4 Step-wise regression separated by vowel

Since a primary goal of this project was to explore the possible relationships between acoustics and evaluations of social identity, stepwise regressions were used to build exploratory models that offered insight into which acoustic characteristics of the stimuli predicted listener evaluations of speaker social identity. The stepwise regressions were calculated using the F1, F2, and  $F_0$  of each stressed vowel (/a/, /e/, /i/, /u/) as independent variables. Each dependent variable in the study (perceived sexual orientation, perceived height, perceived age, and perceived social class) was examined in a separate regression model. A summary of the regression results is found in Table 4.2. The significant predictor of evaluations of perceived sexual orientation was speaker F2 values of the mid front vowel /e/ in *la manera*; they accounted for approximately 22% of the variation. Approximately 46% of the variation in perceived height ratings was predicted by  $F_0$  of /a/ in *la manera*, and an additional 12% was predicted by F2 frequencies of /i/ in *la vida*. Ratings of perceived social class were predicted by F1 of /i/ in *la vida* (42%) and by  $F_0$  of /a/ in *la manera* (17%), while the significant predictors of perceived age were  $F_0$  of /e/ in *la gente*, which accounted for 20% of the variation, and  $F_0$  of /u/ in *el mundo*, which accounted for 25% of the variation.

##### Perceived sexual orientation

	<b>B</b>	<b>SE B</b>	<b><math>\beta</math></b>
Constant	12.12	3.63	
F2 (Bark) of /e/ in <i>la manera</i>	-0.637	0.28	-0.48*

Note  $R^2 = .22$ , \*  $p < .05$

##### Perceived height

	<b>B</b>	<b>SE B</b>	<b><math>\beta</math></b>
Step 1			
Constant	0.239	0.679	

$F_0$ of /a/ in <i>la manera</i>	0.735	0.186	.681*
Step 2			
Constant	-4.02	2.06	
$F_0$ of /a/ in <i>la manera</i>	0.747	-.17	0.69*
F2 of /i/ in <i>la vida</i>	0.3	0.14	0.34*

Note  $R^2 = .46$  for Step 1;  $\Delta R^2 = .58$  for Step 2 ( $p < .05$ ), \*  $p < .05$

**Perceived social class**

	<b>B</b>	<b>SE B</b>	<b><math>\beta</math></b>
Step 1			
Constant	-0.73	1.03	
F1 of /i/ in <i>la vida</i>	1.22	0.34	0.65*
Step 2			
Constant	-3.23	1.28	
F1 of /i/ in <i>la vida</i>	1.33	0.29	0.7*
$F_0$ of /a/ in <i>la manera</i>	0.6	0.22	0.42*

Note  $R^2 = .42$  for Step 1;  $\Delta R^2 = .59$  for Step 2 ( $p < .05$ ), \*  $p < .05$

**Perceived age**

	<b>B</b>	<b>SE B</b>	<b><math>\beta</math></b>
Step 1			
Constant	59.95	14.32	
$F_0$ of /e/ in <i>la gente</i>	-7.58	3.59	-0.45
Step 2			
Constant	57.16	12.21	
$F_0$ of /e/ in <i>la gente</i>	-20.08	5.39	-1.18
$F_0$ of /u/ in <i>el mundo</i>	12.67	4.5	0.89

Note  $R^2 = .20$  for Step 1;  $\Delta R^2 = .45$  for Step 2 ( $p < .05$ ), \*  $p < .05$

Table 4.2. Stepwise regression results for acoustic measures of vowels, all factors.

#### 4.3.3.5 Factor analysis of listener ratings

In the above examination of listener consistency and variation in ratings it was determined that there were distinct patterns of listener evaluations of perceived sexual orientation, but that these differences were not due to differences in mean ratings or

standard deviations of the ratings. A possible explanation for the differences observed is that different groups of listeners responded differently to specific acoustic parameters in the stimuli. In order to explore this hypothesis, a correlation (Spearman  $\rho$ ) analysis between perceptions of sexual orientation and mean acoustic characteristics of the stimuli was conducted; the listener data was separated by the clusters derived in a factor analysis. A summary of these data is found in Table 4.3. The correlation analysis showed that there were listeners whose ratings were significantly correlated to mean F2 values in all but one cluster. Five individual listeners in three clusters had significant correlations between ratings and mean F1 values, while two listeners' ratings (in two unique clusters) were significantly correlated with estimated vocal tract length. Just one listener had scores significantly correlated with mean  $F_0$ , and one listener had ratings significantly correlated with average vowel space dispersion. This does little to clear up the issue of uniformity, as it suggests that the majority of listeners for whom there is a significant correlation responded to the same acoustic parameter (mean F2 frequency that, as we have seen, is attributable to F2 of certain tokens of /e/), regardless of the patterning of their individual ratings. One possible explanation is that beyond the arguably primary role of those F2 frequencies, unique combinations of acoustic factors make a difference in each listener's perceptions of sexual orientation, and there is an aggregate effect (see Eckert, 2000; Levon, 2007) that is unique to each individual. If that is the case, it may be beneficial for future studies to examine differences across individuals as well as group-wise patterning.

Listener ID	Sex	Cluster Number	Mean F1 (Bark)	Mean F2 (Bark)	Est. vocal tract length (cm)	Mean $F_0$ (ERB)	Dispersion (Bark)
s208	female	1	-.163	-.119	.068	.112	.191
s211	female	1	.216	-.360	-.092	.029	-.048
s503	male	1	.071	-.492*	.122	.057	-.076
s505	female	1	-.035	-.216	.038	.139	-.189
s510	male	1	.372	-.584**	.270	-.270	-.128
s512	female	1	.137	-.277	.416	-.019	.094
s514	female	1	.626**	-.388	.158	-.215	.084
s204	female	2	.421	-.287	.072	.082	.062
s501	female	2	.098	-.565**	.249	.102	-.014
s504	female	2	.195	-.499*	.282	.238	-.347
s506	female	2	.356	-.660**	.514*	-.089	-.149
s513	female	2	.240	-.168	-.257	.196	.047
s201	female	3	-.158	-.304	.061	.449*	-.012
s202	female	3	.381	-.557*	.673**	.135	-.167
s307	male	3	.090	-.274	.443	.381	-.272
s203	female	4	.179	-.198	.278	.150	-.007
s205	female	4	.170	-.440	.213	.093	-.034
s209	female	4	.319	-.283	-.159	-.177	-.088
s210	female	5	-.341	.172	-.419	.307	.187
s502	female	5	.558*	-.616**	.299	-.083	.462*
s509	male	5	.539*	-.549*	.395	-.052	-.209
s206	male	6	.530*	-.462*	.222	-.042	-.282
s207	female	6	.473*	-.417	.265	-.097	-.249

\*  $p < .05$  (two-tailed); \*\*  $p < .01$  (two-tailed)

Table 4.3. Correlations (Spearman  $\rho$ ) between individual listeners' perceived sexual orientation ratings and average acoustic characteristics of the stimuli, separated by the clusters derived from a factor analysis [see text for details].

#### 4.3.3.6 Correlation between average acoustic characteristics and social judgments

The relationship between mean acoustic characteristics and average listener ratings of sexual orientation, perceived height, perceived age, and perceived social class was also analyzed. Correlation analyses revealed that perceived sexual orientation was

significantly correlated with mean F2 measures,  $r = -.572$ ,  $p$  (two-tailed)  $< .05$ , with speakers perceived as more gay sounding having higher F2 frequencies (fronter vowels). There were no significant correlations between perceived sexual orientation and mean F1, mean  $F_0$ , or mean vowel space expansion or estimated vocal tract length.

The relationship between mean acoustic factors and perceived height, social class, and age differed from the relationship between mean acoustic factors and perceived sexual orientation. Perceived height was significantly correlated with mean F2 ( $r = .467$ ,  $p < .05$ ), with speakers perceived as taller having lower mean F2 frequencies (backer vowels). Perceived height was also significantly correlated with mean  $F_0$  ( $r = .603$ ,  $p < .05$ ), with speakers perceived as taller having lower mean  $F_0$ . Perceived social class had a significant relationship with mean F1,  $r = .553$ ,  $p < .05$ , with speakers evaluated as being from a higher social class having lower mean F1 frequencies ("higher" vowels). Perceived age, on the other hand, was not significantly related to any of the mean acoustic measures.

#### **4.4 Discussion of experimental findings**

The results of the experiment indicate that there are distinct patterns of listener evaluations of perceived sexual orientation shared among clusters of listeners, and that there is variation among individuals within those groups as far as which acoustic cues are significantly correlated to evaluations. Although it is undisputable that there are "shared socially constructed beliefs (i.e. stereotypes)" (Strand, 1999, 87) about speech variation, and that listeners make evaluations of speaker sexual orientation, there is observable variation in listener evaluations in an overt task such as this. As mentioned above, more studies are needed to examine differences across individuals as well as group-wise

patterning. Additional quantitative data on the possibility of aggregate effects may also be useful for larger discussions of how social identity is created and interpreted, as well to discussions of linguistic profiling and discrimination.

The data show that evaluations of perceived sexual orientation are significantly correlated with F2 values of two mid front vowel (/e/) tokens, with speakers with higher F2 values (more front [e]) more likely to be rated as gayer sounding, and those with lower F2 values (more back [e]) as straighter sounding. An exploratory stepwise regression analysis estimated that about one-fifth of the variation in listener judgments of perceived sexual orientation was accounted for by F2 frequency values of the /e/ token in the article-noun combination *la manera*. This role of F2 is somewhat parallel to a result reported in Munson et al. (2006), in which the investigators found that one of the significant correlations of judgments of sexual orientation in English was the F2 frequency of back vowels, although in this study it was the F2 frequency values of mid front vowels that showed a significant effect. This suggests that although there may be similarities in the type of phonetic factors (e.g., F2 frequencies) that contributes to evaluations of sexual orientation cross-linguistically, the context in which those factors are relevant (e.g., in front or back vowels) depends on local interpretations. This corresponds with Johnson's (2006) cross-linguistic analysis of relationships between height, gender, and vowel production. More cross-linguistic data is needed in order to establish a taxonomic scheme for the influences of acoustic factors on perception of social identities across languages. More investigation is also needed to identify the relevant variables within languages and across the gender and sexuality continuum.



The finding that F2 frequencies of /e/ are correlated to listener evaluations of sexual orientation also has implications for the study of Spanish vowel variation. As mentioned earlier, some variation according to contextual and social factors has been reported for unstressed vowels in Spanish, but there are few studies documenting variation in stressed vowels and little data that links stressed vowel variation to social attributes. This task, however, has shown that the variation in F2 that occurs in certain stressed vowels has enough socioindexical weight to influence evaluations of sexual orientation. This finding, as well as the finding that F1 values of high vowels are linked to evaluations of social class, highlight a need for acoustic studies of the Spanish vowel system that examine variation beyond that which can be captured in narrow phonetic transcription.

Listener judgments of speaker sexual orientation had a significant relationship with listener judgments of perceived height, but not with perceived social class or perceived age. In this case, speakers who were evaluated as gayer sounding were more likely to be evaluated as shorter. This corresponds with data from Munson et al. (2006), which showed a correlation between listener judgments of speaker perceived sexual orientation and perceived height. Taking into account the anecdotal elements of the gay male speech stereotype, it is somewhat surprising that there was no correlation between perceived sexual orientation and perceived social class. One possible explanation for this is the fact that the stimuli for this study, which was part of a larger project on /s/ variation, did not include any instances of /s/. Variable /s/ production has been one of the most extensively studied sociolinguistic phenomena of Spanish and is well documented as a correlate of social class in Caribbean Spanish (Alba, 1990; Cedergren, 1978; Lafford,

1986; López-Morales, 1983; *inter alia*). It is possible that evaluations were affected by the absence of a variable strongly correlated with social class such as /s/; perhaps the remaining cues did not carry enough of a socioindexical impact in terms of social class to reveal relationships that might exist. Since /s/ realization is so highly correlated with social factors from a production standpoint, future studies are needed to assess the impact of /s/ production on perception of social identities as well.

The results of the study contribute to the understanding of acoustic factors and perception of social identities from a cross-linguistic perspective. The study points to the need for more data on individual variation and group-wise patterns in social evaluations. It underscores the complex nature of identity, as well as the acute sensitivity that listeners have for phonetic variation and social identity regardless of their native language background.

To summarize, in addition to its main purpose of dividing the talker stimuli into groups based on perceived sexual orientation, the explicit measures perceived social identity task was significant for being the first of its kind in Spanish, and provided a number of insights into the larger question of socially stratified variation and identity. The most significant results include the finding that ratings of perceived sexual orientation are correlated to ratings of perceived height, and that the most significant predictor of judgments of perceived sexual orientation were F2 values of the mid front vowel /e/. This last result has significant implications for the study of vowel variation in Spanish, and highlights the need for more investigation of the role of formant frequencies in perception of social identity, since it shows that socioindexical cues at a level different

from what is captured by a narrow phonetic transcription are relevant in the perception of sexual orientation as well as social class.

## **Chapter 5**

### **Experiment Three**

#### **Implicit measures voice recognition task**

##### **Methods**

###### **5.1 Overview of methods**

An overview of the methods is presented here, with full details following below. The stimuli were produced using an adaptation of a matched guise design (Lambert et al., 1960), in that the same individuals produced three variations of the stimuli containing the variable of interest. The task completed by study participants was a voice recognition task within a priming experiment; this served as an assessment of the relationship between /s/ production and perceived sexual orientation. The data collection procedure was made up of a series of trials. In each trial, listeners heard a prime phase stimulus made up of six article-noun combinations that did not include any examples of a syllable-final /s/. The listeners were instructed to try to remember the voice. Then there was a short distracter task. After the distracter task, there was a test phase. The test phase stimulus was made up of one phrase that included the syllable-final /s/ in one of its three variations: sibilant [s], aspirated [h], or deleted [0] (phonetic zero). The listeners indicated as quickly as possible if the voice was the same as the voice heard in the priming phase or was a different voice. The listeners' response accuracy and response time were logged; these data were used in the analysis. In the next trial, the sequence began again. In most cases, the priming voice matched the test phase voice, but there were a number of distracter trials in which the voices did not match. A visual representation of a trial is found in Figure 5.1.

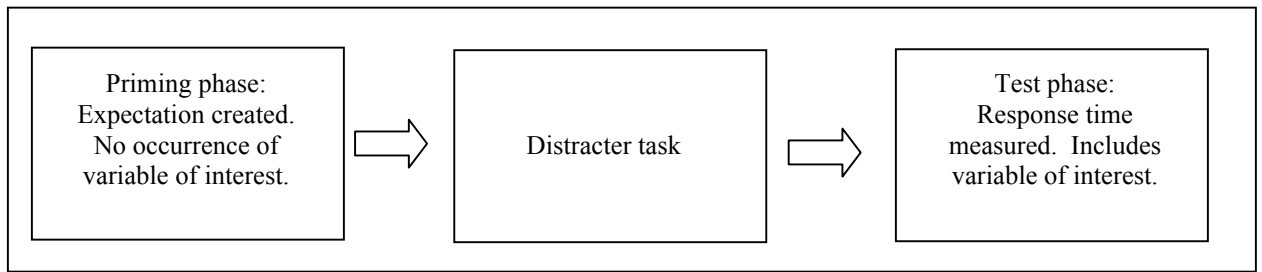


Figure 5.1. Sequence of an experimental trial.

As the figure shows, in the priming phase an expectation of the talker's social identity is created. As discussed in Chapter Two, the underlying logic of this type of task is that when subjects are exposed to a stimulus, a set of associations related to that stimulus is activated. Thus, when listeners hear a gay sounding voice, it activates a set of beliefs about gay sounding talkers (i.e., stereotypes). The response times gathered in the test phase, then, are a measure of the association between the variable of interest and those stereotypes. Variants that are more closely associated with (or more congruent to) the speech stereotype will be processed faster than those that are not (or are less congruent).

## 5.2 Pilot study

The experimental methods were tested in a pilot study. The pilot study examined the interaction between perceived sexual orientation and different types of /s/ (natural, neutral, dental, and frontal) in English. Although /s/ type in English and the /s/ in Spanish are not known to be related in terms of their role in stereotypical gay speech, the pilot study did confirm that listeners were able to complete the voice recognition task as planned (with single word priming phase stimuli), and were able to accurately recognize speaker voices in each trial. For the English pilot study, there were statistically

significant differences in the listener response times for talkers who had been previously rated as gay sounding and talkers who had been previously rated as straight sounding, with longer response times for perceived gay sounding talkers than for perceived heterosexual sounding talkers. There was also a main effect of /s/ type in English, with longer response times for the frontal and dental variants. However, there was no combined effect of /s/ type and perceived sexual orientation on the response times. This means that the talker perceived sexual orientation affected response times, and that the type of /s/ affected response times, but that the combination of straight sounding or gay sounding and a particular variant of the /s/ did not have a significant effect on response times.

A hierarchical multiple regression was conducted to verify that the differences in response times were due to variation in the /s/ and the perceived sexual orientation of the speaker, and that they were not due to any possible influence of stimuli duration. The regression model included stimuli duration, differences in /s/ type, and perceived sexual orientation. Stimuli duration was not found to be a significant factor. In the regression, perceived sexual orientation had a small but significant contribution to the model, as did the frontal and dental /s/ types. This again indicates that perceived sexual orientation and the /s/ types have a significant effect on response times. While the results of the pilot study have implications for English, what is important for the current study in Spanish is that the methods were successful in eliciting a measurable relationship between response times and perceived sexual orientation, without having to explicitly mention sexual orientation in the study itself. Full details of the pilot study can be found in Mack and Munson (2008).

### 5.3 The study

The location of the study was a large public university in the San Juan, Puerto Rico, metropolitan area. The choice of location was based on the prevalence of aspiration and deletion in the linguistic profile of the community, as well as the availability of local linguists who served as consultants and university-level students who could serve as study participants.

#### 5.3.1 Stimuli creation: Talker<sup>7</sup> Participants

Male participants who recorded the study stimuli were recruited by fliers, bulletin board postings (both on paper and online), and word-of-mouth. No reference to sexual orientation was made in the fliers or postings. The specific purpose of the study was referred to as "an experiment on speech perception" on the informed consent form. All talkers completed a demographic questionnaire that included questions about their age, region of origin within Puerto Rico, level of education, and linguistic background. The talkers' mean age was 23 years. All were native speakers of Puerto Rican Spanish. Recording sessions for the talkers lasted from 20 to 40 minutes, and each talker was paid \$10.00 for his participation.

Twenty talkers were initially recruited. Local informants helped to identify and recruit several stereotypically gay sounding talkers, but it was assumed that the variation occurring in a group of 20 talkers would provide enough natural variation for two subsets, one of more stereotypically gay sounding talkers, and one of more stereotypically straight sounding talkers, to be identified. In other words, the

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<sup>7</sup> Because 'speaker' is a generic term generally used to refer to any individual who speaks a language (e.g. "native speaker"), I have elected to use the term 'talkers,' when making reference to the study participants who produced the stimuli. The goal of this use of a more distinctive term is to lessen confusion on the part of the reader.

recruitment depended on a convenience sample of willing and available talkers, followed by a systematic rating task with local participants. This task is described in Chapter 4. This approach differs from several of the previous studies on speech and sexual orientation (including Smyth, Jacobs, and Rogers, 2003; Levon, 2006) that either used a more targeted approach in recruiting gay sounding speakers or entrusted the identification of gay sounding and straight sounding men to the investigator(s) or to local informants. The drawback of this practice is that the selection of the talkers (in other words, how closely their voices fit the gay stereotype, or the heterosexual stereotype) is completely dependent upon the investigator's (or a select group of local informants') judgments. An unintended consequence is that the resulting speech samples may reflect the investigator's preexisting view of which speakers are gay sounding and which are straight sounding that may or may not correspond with that of the larger study community. In the current study, identification of which talkers were gay sounding and which were straight sounding were not based on intuitions of one or two informants. Instead, they were based on evaluations made in a systematic study with 23 listeners who were from the same pool of participants as those who completed the voice recognition study. Using the listener ratings of talker perceived sexual orientation, the seven talkers evaluated as the most stereotypically gay sounding and the seven talkers evaluated as the most stereotypically straight sounding talkers were identified by calculating their mean ratings score. These talkers' stimuli were used as the test items in the voice recognition experiment; the stimuli that had been recorded by talkers who were not in either one of the groups were used as practice items and distracter items.



### 5.3.2 Priming phase stimuli

For the voice recognition experiment, the talkers were recorded saying the priming phase stimuli and the test phase stimuli. The priming phase stimuli were six article-word combinations. All article-noun combinations included nouns that are among the top 175 highest frequency words in Spanish (Davies, 2006). The list was designed to include equal numbers of masculine and feminine article-noun combinations. It included three of the five vowels present in the Spanish vowel system in stressed position: /e/, /i/, and /u/, and included /a/ in pretonic position. The fifth vowel, /o/, occurred only in posttonic, phrase-final position. The article-noun combinations were the following (frequency ratings appear in parentheses):

el día '*the day*' (71)

la vida '*the life*' (88)

el tiempo '*the weather*' or '*the time*' (68)

la gente '*the people*' (158)

el mundo '*the world*' (118)

la manera '*the manner*' (152)

The decision to use short duration stimuli was partially based on the success of similar methods in Munson, McDonald, et al (2006). That study, along with subsequent studies using the same stimuli (Munson, Jefferson, et al., 2006; Munson, 2007; Munson and Kuntz, 2007) illustrates that short, single word stimuli are sufficient to establish speaker social identity in the minds of listeners. The decision to include article-noun combinations rather than single words was made in order to lend a more natural sounding

element to the stimuli set, as article-noun combinations are more common in Spanish than are single nouns.

### **5.3.3 Creating the expectation: A recap of priming phase techniques**

As discussed earlier, the goal of the priming phase in the voice recognition task is to activate stereotypical notions of social identity in the mind of the listener, and, ideally, establish a speaker's social identity for the listeners. This has been achieved in various ways in previous experiments. Niedzielski (1999) used a very explicit approach: verbally, by telling the participants that they were going to be listening to a Detroit (Michigan) native or a Windsor (Canadian) native, and in writing, by putting the word “ or "Michigan" on the response materials. Hay, Nolan, and Drager (2006) used a somewhat less direct method, simply writing the word "Australian" or "New Zealander" on the test materials, and not making reference to region at any other time. Hay, Warren, and Drager (2005) paired auditory stimuli with photos to suggest notions of age and social class. While the auditory stimuli and photos differed throughout trials, the photos were actually photos of the same people, in different attire. Strand and Johnson (1996) used photos of peoples' faces to explore the effect of perceived gender on perception, but also illustrated that the perceived gender of the speaker gained by auditory stimuli alone contributes to speech perception. Similar results were found in Munson (2009).

The current study used a combined approach. Because the pilot study had successfully shown that listeners were sensitive to differences of perceived sexual orientation (even when the measures of talkers' perceived sexual orientation had been made using data from independent groups of listeners), talkers in the current study were also rated by an independent group of listeners. The ratings were used to determine

which of the talkers were most reliably judged as gay sounding or straight sounding. In order to facilitate evaluations of the talkers according to sexual orientation (similar to the studies by Niedzielski, 1999, and Hay et al., 2005 and 2006, above), the listeners were told that they would listen to a group of individual talkers who varied in how stereotypically gay sounding or straight sounding they were.

A possible issue with this task, however, was the problem of measuring the extent to which the expectation was actually created in the minds of the listeners. In order to address this, a second experimental condition (henceforth “Condition Two”) was added. In Condition Two, listeners were told that they would listen to a group of individual talkers who varied in how stereotypically upper, middle, or lower class sounding they were. The choice to prime listeners for social class was made based on the strong associations between /s/ production and social class (as attested by numerous studies discussed in the previous chapter). The benefit of including this condition was primarily that it would provide comparison data that would verify that the priming in Condition One had an effect on listener responses. A secondary benefit was that it would provide an exploratory perspective on how perceived sexual orientation and perceived social class might interact.

#### **5.3.4 Test phases stimuli**

The test phase stimuli included two phrases:

*Estos chicos no vienen.* ‘These boys aren’t coming.’

*Estos coches no van.* ‘These cars don’t run.’

The talkers were instructed to read the phrase several times pronouncing each /s/ as [s], several times pronouncing each /s/ as [h], and several times not pronouncing any of the possible /s/ tokens.

### **5.3.5 Characteristics of the stimuli**

Since the main source of data for this experiment was response times, it is important to note the length of the test phase stimuli. The mean length of the test phase stimuli recorded by each of the prime phase talkers was 1379.62 milliseconds (minimum 933, maximum 2123, standard deviation 245.17). Stimuli for each /s/ type test phrase were of comparable length. The mean for the [s] variant was 1453.29 milliseconds (minimum 1018, maximum 1840, standard deviation 229.28), the mean for the [h] variant was 1387.32 (minimum 933.00, maximum 1763.00, standard deviation 229.83), and the mean for the deleted variant was 1298.25 (minimum 970, maximum 2123, standard deviation 224.47). A one-way ANOVA did not show a significant effect of stimulus /s/ type on stimulus duration, but the result was close to the conventional significance level,  $F(2, 81) = 2.95, p = .058$ .

Test phase stimuli recorded by talkers previously rated as gay sounding and talkers previously rated as straight sounding were not as similar in duration. Stimuli recorded by the gay sounding talkers had a mean duration of 1327.21 milliseconds (minimum 970, maximum 1809, standard deviation 226.19), while stimuli recorded by the straight sounding talkers had a mean duration of 1432.02 milliseconds (minimum 933, maximum 2123, standard deviation 254.74). This difference was statistically significant; a one-way ANOVA showed that there was a significant effect of PSO on stimuli duration,  $F(2, , 82) = 3.98, p = .049$ .

### **5.3.6 Listener Participants**

There were 54 listener participants who completed the experimental protocol. Because of technical issues, 11 of these participants' results had to be discarded, resulting in 43 participants whose data was used in the final analysis; this included 21 participants in Condition One and 22 participants in Condition Two. This group was made up of 33 female and 10 male participants, 14 females and 7 males in Condition One, and 19 females and 3 males in Condition Two. All listeners completed a demographic questionnaire that included questions about their age, level of formal education, region of origin, the amount of time they have spent in the San Juan metropolitan area, and their linguistic background. The mean age of listeners was 22.8 years. All were native speakers of Puerto Rican Spanish, and all were undergraduate or Masters degree students at the university.

Listeners were recruited by fliers, bulletin board postings (both on paper and online), and word-of-mouth. No reference to sexual orientation was made in the fliers or postings. The specific purpose of the study was referred to as "an experiment on speech perception" on the informed-consent form. The listeners were paid \$10 for their participation.

### **5.3.7 Procedures**

The experiment was designed and delivered to the participants via E-Prime experiment management software<sup>8</sup>. Listener responses were collected via the number

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<sup>8</sup> E-Prime is a widely used experiment management program developed and produced by Psychology Software, Inc. The E-Prime software enables the researcher to impose a timeline and sequence for events within the experiment, display text, images, and sounds, and automatically logs participant input, including carefully calibrated timed responses. See Schneider, Eschman, and Zuccolotto, 2002.

keypad and the PST serial response box. Paper stickers on the button box and keyboard marked the appropriate buttons as *same*, *middle*, and *different*. The experiment began with instructions that the listeners read through at their own pace, pressing any key on the keyboard to advance. When they were ready to begin, there was a practice block of ten trials to provide an opportunity for them to become accustomed to the task. At the end of the practice block, listeners were instructed to inform the investigator of any doubts or questions they had about the task. After the practice block, the experimental trials began. Upon completion of all the trials, listeners saw a screen telling them that the experiment was complete and thanking them for their participation. The complete experiment text is included in Appendix C.

As sketched in the overview, the data collection was made up of trials. Each experimental trial consisted of three parts, always in the same sequence: the priming phase, the distracter task, and the test phase.

1) The priming phase. Listeners were instructed that they were to listen to the talker and attempt to remember his voice. Listeners heard the six priming phase noun-article combinations, all produced by the same talker. An orthographic display of the words was presented on the computer monitor at the same time the recording was heard. As mentioned, these stimuli did not include the variable of interest, the syllable-final /s/.

2) The distracter task. The distracter tasks were mental math problems or counting exercises. A list of all the math and counting items is found in Appendix C.

3) The test phase. After the distracter task was completed, the listeners were instructed to press the middle button as soon as the screen turns from red to green; this action activated a short beep that corresponded to the start of the stimulus recording for

the test phase. The stimulus for the test phase was auditory only; it was not accompanied by an orthographic display of the word. The listeners were then instructed to press the leftmost button (labeled "same") if the talker was the same talker as in the prime phase, and press the rightmost button (labeled "different") if the talker was a different talker than in the prime phase. The listeners were instructed to press the appropriate button as quickly as possible without compromising accuracy. As mentioned, this is when the study variable of interest, syllable-final /s/, appeared.

All trials appeared in random order. Each listener heard each of the 14 talkers during six trials throughout the experiment: with each of the three /s/ types ([s], [h], phonetic zero) in two different test phrases. This resulted in 84 responses made by each listener, plus the practice block of 10 trials and 14 distracter trials. The complete experiment protocol took approximately one hour to complete.

The response times were logged, and served as a measure of the relationship of /s/ production and the perception of sexual orientation. This technique follows methods successful in Banaji and Hardin (1996), Blair and Banaji (1996), Fazio et al. (1986), and Kawakami, et al. (1998), which document the pervasiveness of automatic stereotyping, the influence of priming on response time to stimuli, and the lack of conscious control over evaluative judgments.

### **5.3.8 Listener linguistic experience and awareness**

One potential variable in the voice recognition experiment is listener linguistic experience and awareness. It is possible that a listener unfamiliar with gay speech stereotypes might attribute variation to different social variables. In order to control for this potential source of variability, each listener participant in the explicit measures

perceived social identity task and the voice recognition experiment completed a short interview immediately before completing their experimental task. As described in Chapter Two, the interview included four questions on speech stereotypes associated with social categories (gender, male sexual orientation, age, and social class) and one question on speech stereotypes associated with Puerto Rican Spanish. As reported earlier, the interviews confirmed that every listener in both tasks was aware of one or more stereotypes of gay male speech; in other words, none of the listeners denied knowledge of a stereotype. It bears repeating that this was not the case with all social categories. For example, some listeners felt that there were either no stereotypes or no differences in actual speech between men and women or between older and younger speakers.

## **5.4 Results and analysis**

### **5.4.1 Overview**

The principal hypotheses evaluated in this experiment were whether response times in a voice recognition task would be influenced by the type of /s/ in the stimuli and the speaker's perceived sexual orientation; whether these variables interacted in a way that suggested that listeners expected different /s/ types for talkers whose voices had different perceived sexual orientations; and whether this interaction emerged only in a task in which the listener's attention was drawn explicitly to sexual orientation as a potential source of variation.

In order to assess these hypotheses, a number of descriptive and inferential analyses were carried out. First, accuracy analyses were conducted to determine the overall performance of the listeners on the voice-recognition task. This analysis uses  $d'$  (or  $d$ -prime) measures, that is, measures of the detection of whether a voice changed



between the priming phase and the test phase. D-prime (MacMillen and Creelman, 2004) has the advantage over conventional percent correct analyses in that it accounts for both hits (cases where the prime voice and the test voice were the same and were correctly identified as such) and false alarms (cases where the voices were not the same, but where the listener identified the test talker as the same as the prime talker). The  $d'$  value indicates whether the listener exceeded a threshold of detection, and whether she or he was biased to providing a particular response (i.e., it was used to uncover any potential response biases).

The next analysis examines the influence of /s/ type, speaker PSO, and experimental condition on response time using a mixed-model ANOVA. This is followed by separate ANOVAs examining the influence of /s/ type and PSO on response times separately for listeners in Condition 1 and Condition 2 to determine what effect, if any, the condition priming had on responses. Following that is an analysis of the potential effect of stimulus durations on response times. Finally, I present an analysis of responses by individual talker and a discussion of the potential impact of listener variability.

## **5.4.2 Accuracy analysis**

### **5.4.2.1 Accuracy analysis: Accuracy counts and percentages**

Overall, listeners accurately judged the prime talker as the same or different 78% of the time (3593 correct judgments of 4625 possible). The listeners were more accurate in those cases where the priming phase talker was different than the test phase talker (“no” cases, or where the correct answer was “no, the talker is different”); they correctly responded that the talkers were different in 91% of those cases (1068 correct judgments

of 1170 possible). In comparison, the accuracy rate for the cases in which the prime talker was the same as the test talker (the “yes” cases, or where the correct answer was “yes, the talker is the same”) was 73% (2525 correct judgments of 3455 possible). The differences in accuracy rates may be partially due to the fact that the experiment included more “yes” cases than “no” cases by design (because the overall goal was to compare response times for the “yes” cases). It is possible that listeners expected that there should be an equal distribution of “yes” and “no” answers, and as a result there is an inflated number of “no” responses.

#### **5.4.2.2 Accuracy analysis: d'**

In this experiment, listeners attempted to detect when the test voice was the same as the priming voice, and their success in responding correctly when the test voice matched the priming voice is reflected in the percentage values above. However, although counts and percentages give some perspective on accuracy, looking at percentages does not address the possible role of response bias in listener responses, and therefore is not an accurate reflection of listener sensitivity to the stimuli. For example, if a listener was unsure of an answer, he or she might tend to respond with “same” more often than he or she responded with “different.” In that case, the percentage values may not be an accurate reflection of how well listeners performed in the detection task. In other words, if the listener replied “same” for every item, his or her percentage correct for the items where the prime talker *is* the same as the test talker would be 100%, because he or she correctly identified the test talker as the priming phase talker in all situations in which that was the case. However, this would mean that the percentage correct for the cases where the prime talker and test talker are *different* is zero; the 100% statistic

doesn't give a true picture of the listener's sensitivity to the signal. Therefore, it is important to contextualize the percentage scores and interpret them in an analysis that takes into account potential response biases. Signal detection theory, or detection theory, provides a way to take this into account.

The basis for signal detection theory is that almost all reasoning and decision-making tasks occur in an environment where there is some uncertainty (Heeger, 2009). With the uncertainty comes a possible response bias. In the hypothetical case above, the listener's response bias is for saying that talkers are the same. The listener is not very good at differentiating between "Signal Present" (when the talker is, in fact, the same) and "Signal Absent" (when the talker is different) situations. If we were to plot the distributions for the responses to the Signal Present and Signal Absent conditions, we would see that there was little difference in the distribution. The measures that describe sensitivity in signal detection theory are based on the relative relationships between these Signal Present and Signal absent distributions. If someone is more sensitive to the signal, the difference between the two distributions is greater, and if one is less sensitive, the difference is smaller. Heeger (2009) notes:

This number,  $d'$ , is an estimate of the strength of the signal. Its primary virtue, and the reason that it is so widely used, is that its value does not depend upon the criterion the subject is adopting, but instead it is a true measure of the internal response.

To calculate  $d'$ , each data point is coded into four possible response types: 1) hits (those cases in which the listener correctly identified the test talker as the same as the priming phase talker; 2) false alarms (those cases in which the listener identified the test

talker as the same as the priming phase talker, when in fact he wasn't); 3) misses (those cases in which the listener identified the test talker as different than the priming phase talker, when in fact he wasn't); or 4) correct rejections (those cases in which the listener correctly identified the test talker as different than the priming phase talker). This system is illustrated in Table 5.1.

	<b>Listener response: “talker is the same”</b>	<b>Listener response: “talker is different”</b>
<b>Stimuli: talker is the same</b>	Hit (1)	Miss (3)
<b>Stimuli: talker is different</b>	False alarm (2)	Correct rejection (4)

Table 5.1. Response type coding system.

The formula for signal detection analysis compares the hit rate (the number of hits as a proportion of the number of possible hits) to the false alarm rate (the number of false alarms as a proportion of the number of possible false alarms). The  $z$  score (or  $z$  transform) for the false alarm is subtracted from the  $z$  score from the hit rate. The resulting statistic ( $d'$ ) is a measure of the difference between hit rate and false alarm rate.

A higher absolute  $d'$  value means that there is more sensitivity to the difference between the Signal Present and Signal Absent distributions, which translates to a subject's higher sensitivity, while a  $d'$  value near zero is a reflection of chance performance (Claremont, 2009; MacMillen and Creelman, 2004). In terms of this experiment, if we observe similar  $d'$  values for all stimuli types across both gay and straight sounding talkers, it would indicate that listener sensitivity is relatively stable and

is not influenced by differences in the type of /s/ listeners hear or by perceived sexual orientation. If we observe  $d'$  prime values close to zero, it indicates that the listeners are performing at about chance level and that the signal is not strong. High  $d'$  prime values will mean that the signal is stronger, and as a result listeners are more sensitive to it.

In this experiment,  $d'$  analysis was conducted for the [s] and deleted variants. (Aspirated tokens were not used for the stimuli in which the test talker did not match the prime talker, so it was not possible to calculate  $d'$ .) The mean  $d'$  values were lowest for the gay PSO + deleted variant, followed by the straight PSO + deleted variant, then the straight PSO + [s] variant and the gay PSO + [s] variant. This information is summarized in Table 5.2. In other words, the signal was weakest and listeners were least sensitive to differences in the case of gay sounding talkers producing the deleted variant, and the signal was strongest and listeners were most sensitive to differences in the case of gay sounding talkers producing the [s] variant.


	$d'$	standard deviation	
[s] + gay sounding	1.89	.58	
[s] + straight sounding	1.87	.50	
del + straight sounding	1.48	.69	
del + gay sounding	1.14	.76	

Table 5.2. Values of  $d'$  by /s/ type and perceived sexual orientation.


The  $d'$  data was analyzed in a two factor repeated-measures ANOVA. The two factors were PSO (the perceived sexual orientation of the speaker, as established by an independent group of listeners) and /s/ type (sibilant [s], aspirated [h], and the deleted variant). There was a significant main effect of PSO,  $F(1, 42) = 7.15, p < .005$ . There

was also a significant main effect of /s/ type,  $F(1, 42) = 42.61, p < .005$ , and a significant combined effect  $F(1, 42) = 10.91, p < .005$ . These results indicate that there was a difference in listeners' sensitivity based on PSO and /s/ type. When listeners heard the deleted variant produced by speakers who were stereotypically gay sounding, their hit rate was closer to the false alarm rate than in any other combination.

There are several possible interpretations for this finding. One is that [s] tokens were more easily processed than deleted tokens. There are numerous studies that document that ease of processing is influenced by speech clarity (see Tucker and Warner, 2007; Ernestus, Baayen and Schreuder, 2002). With [s] tokens, there was more phonetic information available to process the signal than with the deleted variants. Therefore, ease of processing could translate to a stronger signal and more sensitivity to [s] tokens. This could account for the statistically significant differences between /s/ types, but there is also a statistically significant difference between gay sounding talkers and straight sounding talkers, and well as a significant combined effect. A possible interpretation of this is that there is an interaction between speech clarity and prototypical gender. Studies have shown that processing is affected by gender prototypicality (Strand, 1999 and 2000). In the  $d'$  data, there are four possible combinations of perceived sexual orientation and /s/ type:

- A) [s] + straight sounding voice
- B) deleted + straight sounding voice
- C) [s] + gay sounding voice
- D) deleted + gay sounding voice

Figure 5.2 presents a model for interpreting these data based on the predicted effects of gender prototypicality and speech clarity on responses. From what is known about the effects of gender prototypicality and speech clarity on speech processing, we would expect the strongest signal to appear in cell A ([s] + straight sounding voice), since this combination is the strongest both in terms of gender prototypicality and speech clarity. This prediction is not contradicted by the data, which show the combination at the higher end of all combinations ( $d' = 1.87$ ). Next, we would expect cell D (deleted + gay sounding voice) to have the weakest signal, since it is weakest both in terms of gender prototypicality and speech clarity. This data is consistent with this prediction as well. We would expect cell B (deleted + straight sounding voice) to be an intermediate case, since it is made stronger by its gender prototypicality but weaker by its lower speech clarity. This is indeed the case. Finally, we would expect cell C ([s] + gay sounding voice) to also be intermediate, as it is weaker in terms of gender prototypicality but stronger in terms of speech clarity. This, however, is not the case. In fact, it is the strongest signal. I hypothesize that the strength is a reflection of the strength of association between the sibilant [s] variant and the perception of the speakers as gay sounding. Accuracy in the task is facilitated not only by gender prototypicality and speech clarity, but also by relationships between the variants and perceived sexual orientation.

		<b>/s/ type</b>		
		<b>[s]</b>	<b>deleted</b>	
<b>Perceived sexual orientation</b>	<b>Perceived as straight sounding</b>	A Expected: Stronger Observed: Stronger	B Expected: Intermediate Observed: Intermediate	Expected: stronger signal in terms of gender prototypicality 
	<b>Perceived as gay sounding</b>	C Expected: Intermediate Observed: Stronger	D Expected: Weaker Observed: Weaker	


  
Expected: stronger signal in terms of clarity

Figure 5.2. Model of combinations of perceived sexual orientation and /s/ type.

### 5.4.3 Response time analysis

#### 5.4.3.1 Response time analysis: Overview and trends in mean response times

For the response time analyses, responses longer than six seconds were not considered in the data analysis, as they were assumed to be the result of listener distraction or inattention. There were 78 of 2590 responses (approximately 3.0%) that fell into this category in Condition 1, and 92 of 2474 responses (approximately 3.7%) that fell into this category in Condition Two, for a total of 170 of 5064 (approximately 3.4%) responses discarded in the whole experiment.



For the individual response time analysis, each listener's hits mean response time and standard deviation were calculated. Responses more than three standard deviations from the mean response times were discarded (this was less than 3% of the data), and the standardized score was calculated. This convention of data trimming is often used in studies utilizing reaction times (Cohen and Lea, 2004), and is considered the most robust method as it limits the potential effect of outliers, non-normal distributions, and differences in variance (Wilcox, 1998).

Mean response times for [s] were fastest overall, with a mean time of 1979 ms, followed by the aspirated variant ([h]), which had a mean response time of 2002 ms, and the deleted variant had the slowest mean response time, at 2081 ms. In addition, listeners responded more quickly overall to gay sounding talkers. The overall mean response times for gay sounding talkers was 1977 ms, while the mean response times for straight sounding talkers was 2064 ms. The quickest responses according to /s/ type and perceived sexual orientation were for [s] and [h] produced by gay sounding talkers, followed by the [s] produced by straight sounding talkers, then the [h] produced by straight sounding talkers. The slowest responses were for the deleted variants as produced by both groups. The mean response times for each /s/ type according to the perceived sexual orientation of the talkers is summarized in Figure 5.3.

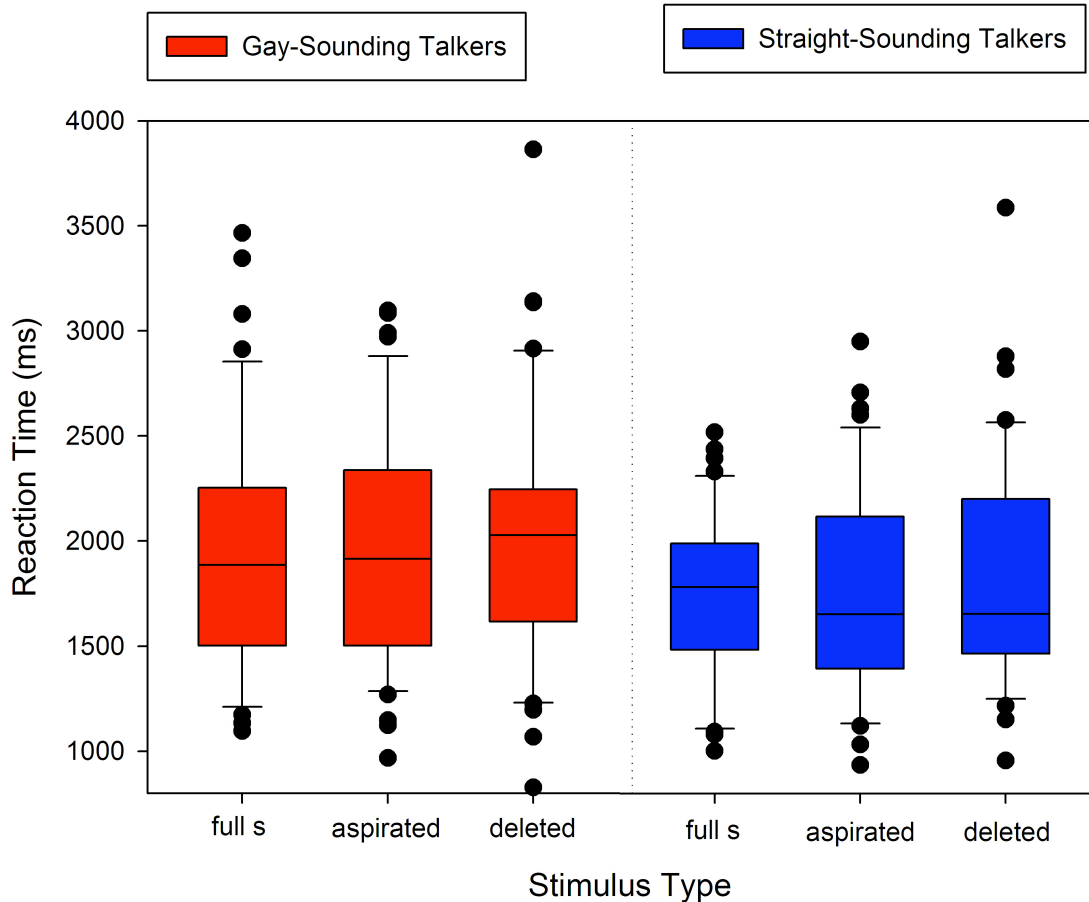


Figure 5.3. Mean response times, by perceived sexual orientation and /s/ type.

#### 5.4.3.2 Response time analysis: ANOVA

The response time data was analyzed in a three factor mixed model ANOVA. There were two within subjects factors, PSO (the perceived sexual orientation of the speaker, as established by an independent group of listeners), /s/ type (sibilant [s], aspirated [h], and the deleted variant), and one between subjects factor, condition (Condition One, PSO priming, and Condition Two, SES priming). There was a significant main effect of perceived sexual orientation,  $F(1, 41) = 6.47, p < .05$ , with responses to gay sounding talkers faster than straight sounding talkers. This was the only statistically significant main effect, and there were no statistically significant interactions.

In other words, listeners responded quicker to the talkers who had been previously rated as gay sounding, slower to the talkers who had previously been rated as straight sounding, and this difference was statistically significant.

This finding is in direct contrast to the pilot study findings. As reported in Section 5.2, the pilot study for this experiment found that in English the opposite effect occurred, with listeners responding slower to gay sounding talkers and faster to straight sounding talkers. Mack and Munson (2008) hypothesized that this was due to the relative gender prototypicality of the gay and straight sounding voices, with straight sounding voices parsed more quickly because they were more easily categorized as male. Following this line of reasoning, these data support the idea that gender prototypicality operates in distinct ways across languages. However, this finding is also problematic in light of the proposed explanation for the  $d'$  results. In Section 6.2.2, I proposed that gender prototypicality had an influence on accuracy, and assigned straight sounding talkers as those with most prototypically male voices. An interpretation of these ANOVA results as a measure of prototypicality conflicts with that line of reasoning, although it must be noted that measures of accuracy and facility are not necessarily comparable measures. Certainly, more quantitative and qualitative data is needed to confirm or refute these hypotheses.

#### **5.4.3 Response Time Analysis: By Condition**

Although the mean response time ANOVA did not show a significant effect of condition, the means plots suggested that there might be distinct trends in the data depending on the priming condition (Condition One, PSO priming; Condition Two, SES priming). Examining these different trends may provide a potential explanation and a

better interpretation of the above ANOVA results. For this reason, a separate analysis of the data by condition was conducted. For each condition, a two factor within-subjects ANOVA was carried out, with PSO and /s/ type as the two factors. The mean response time for Condition 1 was 1965 ms, and for Condition Two it was 2025 ms (as mentioned above, not a statistically significant difference).

#### **5.4.3.3.1 Condition One Overview and trends in mean response times.**

In Condition One, the mean responses according to /s/ type followed a different pattern from the combined conditions data. The quickest responses in this condition were for the aspirated [h] variant (1940 ms), followed by the [s] variant (1959 ms), and the deleted variant (2004 ms). The mean responses according to talker PSO followed the same pattern as in the combined conditions analysis: the quickest responses were for stimuli from speakers previously rated as gay sounding, with a mean response time of 1940 ms for gay sounding talkers and of 1995 ms for straight sounding talkers.

The mean response times for each /s/ type according to talker PSO was another area where the pattern of Condition One varied from the combined conditions data patterns. The quickest responses were not for the [s] variant as produced by gay sounding talkers, but for the [h] variant produced by gay sounding talkers. The [s] produced by gay sounding talkers did show the next fastest mean response time, however. This was followed by the [s] variant produced by straight sounding talkers, then the [h] produced by gay sounding talkers. As with the combined condition, the slowest responses were for the deleted variants. A summary table of response times according to the perceived sexual orientation of the talkers is found in Figure 5.4.

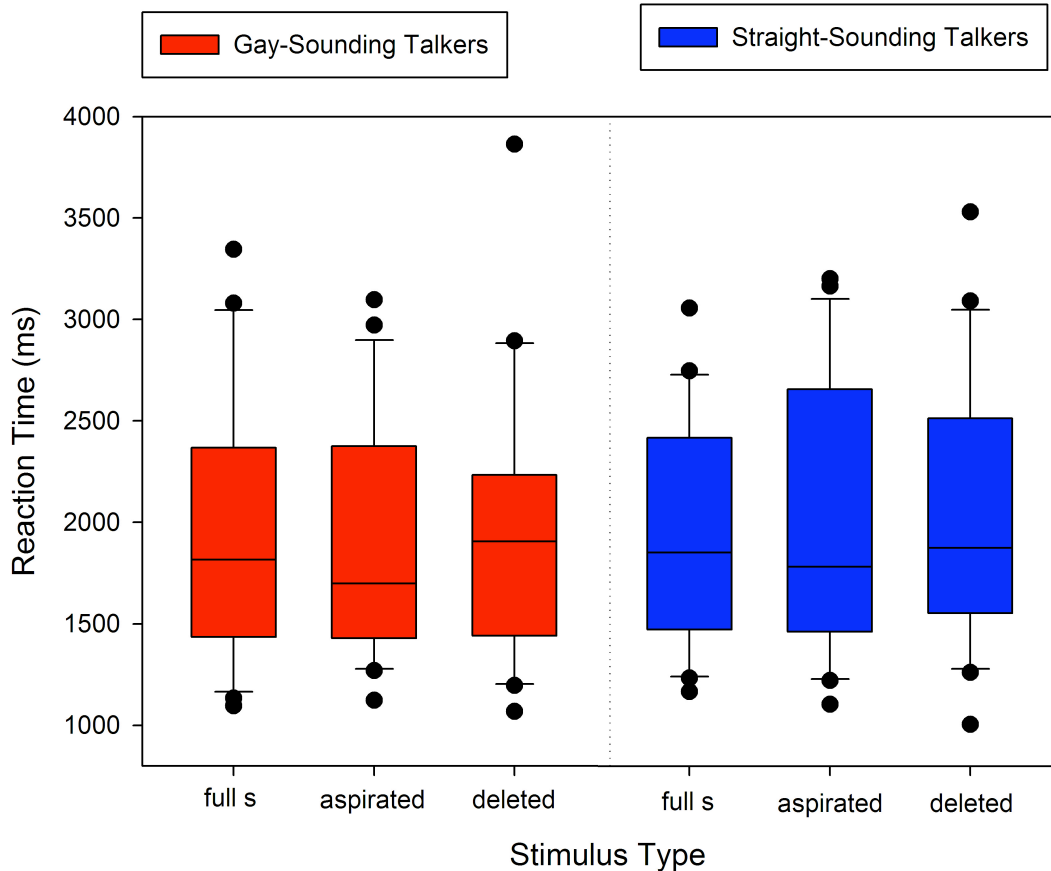


Figure 5.4. Mean response times by PSO and /s/ type, Condition One.

The two factor within-subjects ANOVA for Condition One showed a non-significant main effect of /s/ type,  $F(2, ) = .430, p = .65$ . It also showed a non-significant main effect of PSO  $F(1, ) = 1.57, p = .22$ . There was not a significant interaction effect between PSO and /s/ type on response times,  $F(2, ) = .098, p = .91$ .

#### 5.4.3.3.2 Condition Two Overview and trends in mean response times

In Condition Two, the mean responses according to /s/ type followed the same pattern as the combined conditions data. The responses in this condition were faster for the [s] variant (1998 ms), followed by the [h] variant (2061 ms), and slowest for the deleted variant (2155 ms). The mean responses according to talker PSO also followed the same pattern as in the combined conditions analysis: the quickest responses were for

stimuli from speakers previously rated as gay sounding, with a mean response time of 2013 ms for gay sounding talkers and of 2130 ms for straight sounding talkers.

The pattern of mean response times by /s/ type in Condition Two was similar to the pattern from the combined conditions data. The [s] variant as produced by gay sounding talkers had the quickest responses, followed by the [h] as produced by gay sounding talkers. Next was the [s] as produced by the straight sounding talkers, then the [h] as produced by the straight sounding. As with the combined condition, the slowest responses were for the deleted variants. Response times according to the perceived sexual orientation of the talkers are summarized in Figure 5.5.

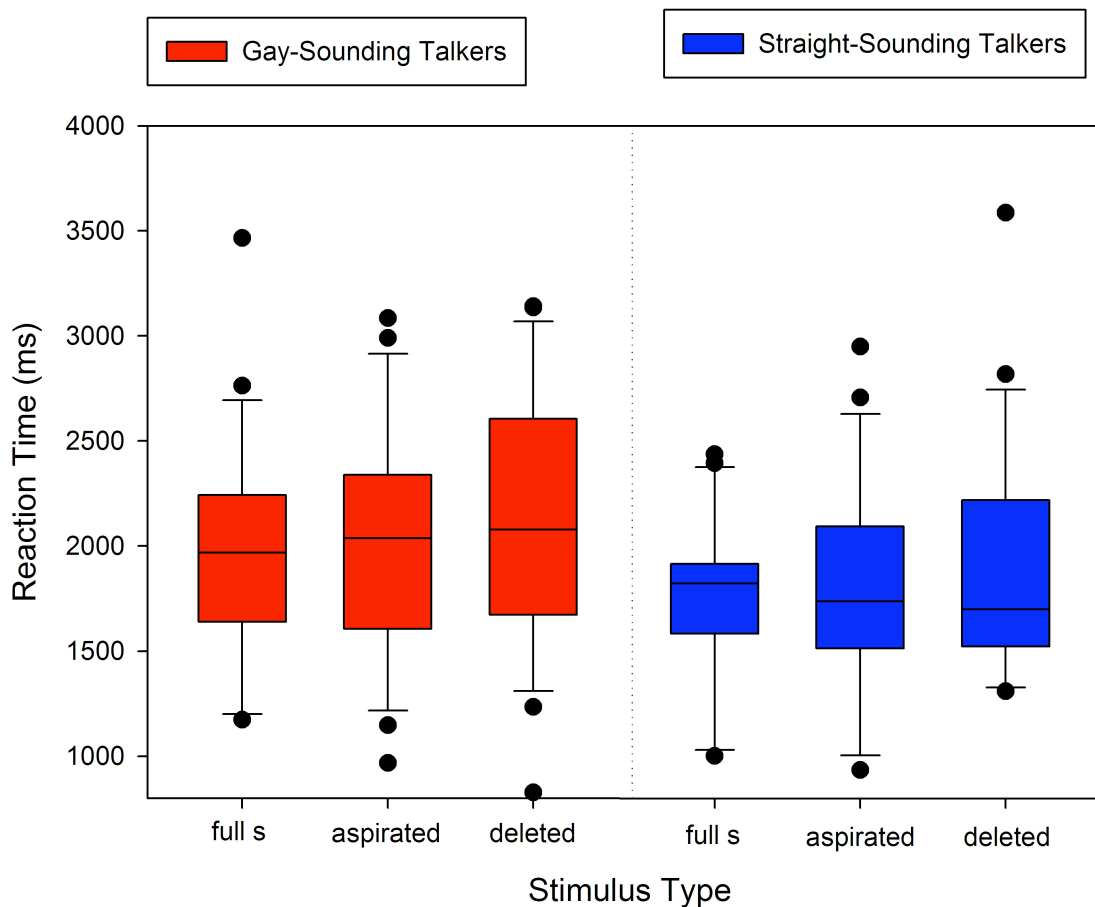


Figure 5.5. Mean response times by PSO and /s/ type, Condition Two.

In contrast to Condition One, the two factor within-subjects ANOVA for Condition Two did show a significant main effect of PSO,  $F(1, 21) = 5.25, p < .05, \eta^2 = .2$ . There was not a statistically significant main effect of /s/ type, but the result was suggestive,  $F(2, 21) = 2.86, p = 0.068, \eta^2 = .12$ . There was no significant combined effect  $F(2, 42) = .056, p = .945, \eta^2 = .003$ . In other words, when listeners were led to believe that the talkers varied in terms of their social class, there was an observable effect of perceived sexual orientation of the talkers and response times.

#### **5.4.3.3 Discussion of differences by Condition**

Although the differences in response times by condition were not statistically significant, it is nonetheless interesting that perceived sexual orientation had a significant relationship with response times in the condition in which perceived sexual orientation was not mentioned at all (listeners were instead led to believe that the variation in voices was due to differences in social class). Why do we see this difference between conditions? One possibility is that the differences in talker sexual orientation were interpreted in Condition Two as differences in social class. However, this explanation is not supported by the available data from the explicit measures perceived social identity task. In that task, ratings of perceived social class and perceived sexual orientation were not correlated. Confirming this, an analysis of the rankings of the 20 original talkers in terms of social class from the data in that experiment showed that perceived sexual orientation groups and perceived social class groups did not align. Among the talkers rated as from a higher social class, six were from the gay sounding group and four were from the straight sounding group (and the inverse, four gay sounding and six straight sounding in the lower social class group). In addition, data from the explicit measures

task indicates that listeners responded to different cues when evaluating social class and sexual orientation (F1 frequencies and F2 frequencies, respectively), so it seems unlikely that there was a wholesale attribution of the differences in perceived sexual orientation as differences in social class by the listeners in Condition Two of the voice recognition experiment.

My hypothesis is the differences between conditions are more likely an artifact of the duration of the stimuli that resulted in longer response times, which in turn limited the usefulness of the implicit task as a measure of unconscious processes. The length of the response times indicates that listeners did not necessarily respond as quickly as possible, but rather listened to the full stimuli before answering. This introduces a larger amount of variability into the data. In Condition One, because the social category of sexual orientation was explicitly invoked, it invited unconscious reflection on the perceived sexual orientation of each voice. Since the stimuli and the responses times were long, it is certainly possible that listeners had enough time to unconsciously reflect on how well the speaker fit a stereotypical gay or straight sounding pattern. From the interview data, we know that many of the listeners had a hyperawareness of stereotypes of gay talkers, and many explicitly stated that they did not believe the stereotype extended to all gay speakers. I believe that in Condition One, the same desire to acknowledge the unfair application of the stereotype had the result of suppressing any differentiation of the speakers by sexual orientation. In other words, the lack of significant relationships in Condition One may be related to the high conscious sensitivity to a gay speech stereotype. On the other hand, in Condition Two, when the listeners were led to think of the variation in the speakers as due to differences in social class, there was no



suppression of the stereotype, and it allowed the associations of prototypicality to come through at an observable level.

### **5.5 Additional analyses: Assessing the potential impact of stimulus duration**

The analysis of stimuli characteristics in Section 5.3.5 revealed that there was a statistically significant difference in the stimuli duration according to perceived sexual orientation [ $F(2, 82) = 3.98, p = .049$ ]. While there was not a statistically significant difference in stimuli duration according to /s/ type, the  $p$  value of the test was nonetheless suggestive of difference [ $F(2, 81) = 2.95, p = .058$ ]. Since the only statistically significant difference in response times was according to perceived sexual orientation (and gay talkers' stimuli was, on average, shorter than straight sounding talkers), stimuli duration could be a possible explanatory factor. In order to explore whether or not stimuli duration played a role in response times, the data of the mean response times and /s/ types as well as the mean response times and perceived sexual orientation were plotted for each condition. A visual inspection of the data showed no evidence of patterns that would suggest that there was a systematic effect of stimuli duration on response times. In other words, from the data distribution, it is unlikely that differences in duration among the factor groups (perceived sexual orientation, /s/ type, and condition) affected results. The plots are included in Appendix D.

### **5.6 Individual talker analysis**

The final analysis examined variation in the response times on an individual talker level. For the other experimental analyses, talkers were classified into one of two groups (gay sounding or straight sounding) based on the mean score of their perceived sexual orientation in the explicit measures perceived social identity task. However, within each

group there was a range. For example, some talkers in the gay sounding group had been evaluated on the extreme end of gay sounding, while others were closer to the middle; the same gradient pattern occurred in the straight sounding group. It is possible that the strength of activation or association between perceived sexual orientation and the /s/ variants was affected by how prototypically gay or straight sounding the talker was. A weaker activation may have led to more confusion within and across listeners, which would create more variation in the data and limit the observable effect. In order to assess the potential role that individual talkers' prototypicality might play, two factor mixed model ANOVAs were conducted for each individual talker, with one within subjects factor, /s/ type, and one between subjects factor, condition. This set of ANOVAs revealed no significant effects of /s/ type or condition for any of the individual talkers.

### **5.7 A discussion of listener variability**

Another possible intervening factor that may have influenced the results in the voice recognition task is that of listener variability. The results from the explicit measures task (Experiment Two) suggest that listeners cluster into groups rather than forming one group that rank-orders talkers identically in terms of perceived sexual orientation as has been previously assumed. It also found that different listener responses correlate to different acoustic cues. If this is the case, it is possible that there was a significant amount of variability in terms of the activation of the speaker identity during the priming task, which contributed to a lack of a clear pattern in the results. It is possible that having a relative, variable activation instead of a more controlled activation (for example, one that may have occurred if each individual had been explicitly identified as gay sounding or straight sounding in each trial) was a factor in the results. While

Experiment Two provided new information on listener variability that has not been previously documented, the in-depth data analysis that uncovered the higher than expected amount of listener variability was conducted after data for Experiment Three was gathered, so it was not taken into account in the experimental design. With the new information on listener variability that Experiment Two has provided, there is a need for follow up studies that take variability into account.

### **5.8 The potential role of interactions between linguistic and social constraints on /s/ aspiration and deletion**

Another possible explanation for the differences we see in these data may be related to the interaction between structural factors and social factors. The review of the literature presented the main influences on /s/ variation in terms of linguistic and extra-linguistic factors, treating these independent variables as fixed and not interrelated; the voice recognition data analysis followed this paradigm and was carried out under the assumption that the structural and social factors do not interact. However, there may be an interaction between these factors, similar to what is reported in New Zealand English by Hay and Maclagan (forthcoming). In other words, the linguistic constraints may be weighted differently for different social groups, so the [s] produced in a certain linguistic context by gay sounding speakers may be more (or less) associated with gay identity than in a different linguistic context. If that is the case, it is possible that the voice recognition study's structural context (*estos* + plural noun) interacts somehow with the social context in a different way than other structural contexts.

## 5.9 Summary

There were two statistically significant results found in the voice recognition experiment. First, there is a stronger than expected signal for [s] stimuli when produced by gay sounding talkers. This suggests a cognitive association between the sibilant variant and gay sounding talkers. Second, the response time analysis showed that there was a statistically significant effect of perceived sexual orientation on response times, with voices perceived as gay sounding processed more quickly than voices that are perceived as straight sounding. This result was observed significantly in the situation where listeners were led to believe that the talkers varied in perceived social class (Condition One), but was not observable at a significant level in the condition in which listeners were led to believe that the talkers varied in perceived sexual orientation (Condition Two).

Since this study is the first of its type, it is useful to discuss the other trends observed in the data even if they did not represent relationships at statistically significant levels. First, there was a suggestive but not statistically significant effect of the type of /s/ a speaker produces on response times. For both gay sounding and straight sounding talkers overall (across conditions) and in Condition Two, the sibilant [s] showed the quickest response times, followed by the aspirated variant, then by the deleted variant. If future studies can observe these differences at a statistically significant level, it would provide cross-linguistic data for the role of speech clarity on cognitive processing.

The trends for /s/ type in Condition One did not follow the same patterns as the overall and Condition Two data. The aspirated variant showed the quickest response time, followed by the sibilant [s] and the deleted variant. If this result were observed at a

more significant level, it would indicate a mismatch between the conscious stereotype of a careful [s] production (the “*hablar fisno*” phenomenon) and the norms for gay speakers in this speech community. If a stronger association between gay sounding speech and the aspirated variant were observed, it would suggest that there is a localized interpretation of a sociophonetic variable, and could be a reflection of the stage of the /s/ aspiration and deletion change in process in Puerto Rican Spanish. Since data from numerous studies indicates that the aspirated variant is the norm in Puerto Rican Spanish, it may be possible that [h] is the variant most accessible for use as a socioindexical cue. By extension, we might hypothesize that aspiration and deletion of /s/ has advanced to the point where the sibilant [s] has been lost to the extent that it is nearly anachronistic, and the aspirated and deleted variants are the variants that hold socioindexical strength. Clearly, there is need for more systematically gathered data on the topic. Some of these possible areas of focus for future studies are presented, along with conclusions of the dissertation, in the following chapter.

## **Chapter 6**

### **Conclusions and recommendations for future research**

#### **6.1 Introduction**

In this dissertation, I have presented research on a new area of inquiry for Hispanic Linguistics, speech and perception of sexual orientation. The study provides an initial documentation of how socially stratified variation interacts with perceived identity in Puerto Rican Spanish. It also calls attention to the need for future research in several areas. This chapter presents the main conclusions of the dissertation, contextualizes the contributions of the work in its field, presents recommendations for future research, and offers concluding remarks.

#### **6.2 Main conclusions of the dissertation**

##### **6.2.1 Experiment One: Interviews on speech stereotypes and social categories**

This experiment showed that there is a conscious stereotype of gay male speech for listeners of this speech community, and that the greatest point of uniformity for the stereotype is that gay men are thought to use “feminine” speech. The specific elements associated with the stereotype include a distinct tone, pitch, or intonation, the use of specific phrases or slang, careful or “better” pronunciation, the use of specific gestures or mannerisms, and distinctive production of specific phonemes, including the /s/.

##### **6.2.2 Experiment Two: Explicit measures of perceived social identity**

This experiment showed that clusters of listeners shared patterns of evaluations, but that there was considerable variation among the listener group as a whole. Listener evaluations of perceived sexual orientation were correlated with perceived height. When

/s/ is not present in the stimuli, F2 values of mid-front vowel /e/ correlate significantly to evaluations of a talker as gay or straight sounding.

### **6.2.3 Experiment Three: Implicit measures voice recognition task**

The  $d'$  analysis showed statistically significant differences in signal strength which may be an indication of closer cognitive association between the sibilant [s] and gay sounding talkers. However, the relationship between /s/ variation and perceived sexual orientation was not verified by the response time analysis. We cannot conclude that there is a significant relationship between /s/ type and talker PSO based on these data. Nonetheless, a response time analysis did show a statistically significant effect of perceived sexual orientation that did not appear to be the result of stimulus duration. This means that listeners are sensitive to socially stratified variation. Furthermore, this analysis showed that there is difference between Spanish and English for this variable, suggesting that there are cross-linguistic differences in processing.

The experiment also showed that there is an effect of priming on response times when talkers are led to believe variation occurs from one broadly defined social identity versus another. The effects of priming on response times in linguistic studies have been observed with different regional varieties (Niedzielski, 1999; Hay, Nolan, and Drager, 2006) and gender (Strand, 1999 and 2000), but have not been observed in the specific case of sexual orientation until now.

### **6.3 Contributions of the dissertation findings to the field**

The main contribution of this dissertation is that it presents an innovative exploration of speech and sexual orientation, with original contributions to both Hispanic Linguistics and Sociophonetics. For the field of Hispanic Linguistics, it is the first to

study the question from an interdisciplinary, systematic standpoint that takes into account qualitative as well as quantitative data. Specifically, it provides data on language attitudes and gay speech stereotypes, including the first systematically collected data available on the specific linguistic elements that make up the conscious stereotype associated with gay men's speech in Spanish. In addition, it provides the first data available on what socioindexical cues are relevant in the perception of sexual orientation in an explicit measures task. It also provides data on the correlations between different aspects of perceived talker identity (sexual orientation, social class, height, and age) as well as the correlations between these identities and acoustic cues present in the stimuli. The documentation of vowel formant frequency as a correlate with perception of social identities is also the first of its kind. Finally, while its contribution to the area of speech perception and social identities (including sexual orientation) breaks ground for a new sub-field of investigation in Hispanic Linguistics, it also contributes to the already well-established study of /s/ variation in Spanish, detailing yet another potential social correlate of sibilant [s].

The study has made several significant contributions to the field of Sociophonetics as well. First, it provides further evidence regarding the pervasiveness of social judgments. Foulkes and Docherty (2006) have noted:

...in general relatively little is known about how and to what extent listeners are able to make judgments about the indexical properties of variability within the speech signal, despite the fact that such judgments are clearly a part of what happens during almost any type of interaction (p. 433).



This dissertation has garnered new information on listener judgments that will contribute to the study of socially stratified variation not only in the area sexual orientation, but also in the area of social identity in general. It also provides important cross-linguistic data to the study of phonetic variation and social identity, adding to the information available on the types of acoustic factors that are used in the perception of social identities across languages.

Another important contribution of this dissertation to the area of Sociophonetics is the documentation of variability in listener ratings. Until now, most studies have considered listener groups that share age, sex, and geographic origin as homogeneous, and the majority of analyses, including the one conducted for the main dissertation experiment, have examined generalizations across participants (Foulkes and Docherty, 2006). The data from Experiment Two is a clear challenge to this experimental paradigm. Those data show that there is considerable variation in responses made by a group of listeners who would be considered as a homogeneous group by traditional standards. This is useful information for sociophonetic methods, as it gives a possible indication of individual variability in capacity for responding to sociophonetic cues and/or individual variability in the interpretation of the cues themselves. As Foulkes and Docherty (2006) note: “In pursuing perceptual evaluation, it would also be instructive to investigate the extent to which individuals differ in their capacity to respond to the sociophonetic properties of stimuli” (p. 433). They also note:

It is likely that sociophonetic variability is strongly governed by the individual’s exposure to the statistical properties of ambient sound patterning and also by how the individual interprets and manipulates his/her social context. Empirical work

in this area therefore requires a focus on how *individuals* perform and interpret sociophonetic variability in a range of communicative settings (p. 433).

On a broader level, this study makes a contribution to questions of speech variation and discrimination. Recently, Preston (2008) has called for more investigation by the linguistics research community into the practice of linguistic discrimination. The relationship between socioindexicality and discrimination is a new and important issue for applied linguistics. Although the precise role of sociophonetic variation in discrimination is outside the scope of this dissertation, the intersection of variation and discrimination is undeniably an important site for in a broader understanding of how and why discrimination occurs. As such, the results of this study will provide information useful to understanding the mechanisms that trigger the perceptions that may lead to discrimination.

#### **6.4 Recommendations for future research**

The findings reported in this dissertation point to several areas for future research. The first and arguably most obvious one is the general area of speech and sexual orientation in Spanish. Since this is the first study of its kind, it is clear that there is a need for future studies to examine this issue and confirm, refute, or add to the findings of this dissertation. Systematic investigation that will further establish a knowledge base should be the first priority. These investigations should address what the relevant socioindexical cues are, and how these cues come together in perception of social identity in Spanish. Mullennix et al. (1995), in their discussion about how voice information about gender is retained in memory and used in phonetic discrimination, interpret the findings of one of their studies as a sign that the representations that people have are

“probably an auditory composite of the various acoustic factors relevant to voice gender like *F0*, formant frequencies, breathiness, etc.” (p. 3091). This dissertation has identified *F2* values and possibly the sibilant [s] as acoustic factors relevant to acoustic-based perceived sexual orientation. While this dissertation took the approach of examining individual factors, the combined results of the voice recognition task, the explicit measures task, and the interview data suggest a variety of socioindexical elements combine to cue perceptions of sexual orientation, so it is likely that additional features come to together in the “auditory composite” of the representative of sexual orientation in Spanish; future studies are needed to explore these questions.

A second important area for future study is the relationship between conscious stereotypes, perception and speech production as related to social categories such as sexual orientation. This dissertation identified acoustic elements relevant to the perception of sexual orientation as well as elements relevant to a conscious speech stereotype. The voice recognition task found some support for a connection between an element of the conscious speech stereotype (that gay men have a more careful pronunciation of the /s/) and an acoustic factor related to perception ([s], as measured by response accuracy), while the explicit measures task identified an acoustic cue correlated to the perception of a talker as gay or straight (*F2* frequencies of the mid-front vowel) that was not cited by any participant as part of the conscious speech stereotype. On the other hand, fundamental frequency (“pitch” or “tone”) was part of the conscious speech stereotype but was not a significantly correlated cue to perceptions of sexual orientation in the explicit measures task. Since there is mounting evidence of a more and more complex relationship between stereotypes and speech processing, for a full accounting of

sociophonetic variation we need to consider the cases of mismatch as well as how stereotypes and acoustic cues work together.

In addition, the question of the acoustic correlates of speech production by self-identified gay and straight talkers is still open. The answer to this question is one that likely must be delayed, as there are still many unresolved methodological issues related to production studies (Kulick, 2000). However, once an appropriate method for exploring speech and sexual orientation from the production side is established, it will be important to address how the quantitative and qualitative findings of this dissertation relate to production studies in Spanish. For example, do self-identified gay and straight men differ in their production of syllable-final /s/ in aspirating and deleting dialects? Is there a difference in F2 frequencies? Is there a difference in fundamental frequencies? Understanding how conscious stereotypes, perception cues, and production data relate to each other is necessary to understanding how and why social variation occurs. It will also be useful in understanding one of the more significant of the various conundra concerning perception and production of sociophonetic variation: how it is acquired.

Another area for future studies is the specific issue of vowel variability in Spanish. Research is needed to address the finding of the relevance of F2 values of /e/ discovered by the explicit measures task conducted as part of this dissertation study. The vowel variability that was documented as a significant factor in evaluations of social identity in this dissertation was outside that which is documented in a broad phonetic transcription. In other words, all instances of /e/ or /a/ were unmistakable tokens of /e/ and /a/, even though their variation in F2 and F1 correlated to differing evaluations of perceived sexual orientation and perceived social class. This suggests a need for

sociolinguistic and sociophonetic studies to look at acoustic factors outside of those traditionally studied as the basis for investigations on what phonetic variables are related to social identity.

The final area for future study that I will discuss is the role of listener variability in perception tasks. As mentioned earlier, groups of listeners are often considered to be homogeneous in terms of their capacity to evaluate social identity, as if this capacity were analogous to perception of phonological categories. The results of this dissertation project suggest this is not the case, and future studies must determine the extent of differences between listeners as well as develop methods for dealing with those differences.

## **6.5 Concluding remarks**

In this dissertation, I have presented the first known systematic study of speech and perception of sexual orientation in Spanish. The findings of this study underscore the nearly axiomatic fact that the relationship between identity and language is complex. It is possible that the combination of cues, more than any single element, is key to perception of social identity. It is also likely that a combination of factors influence socioindexical processes, and this dissertation has attempted to address the role of conscious speech stereotypes and reactions to acoustic stimuli in explicit and implicit tasks. The data and analyses reported here offer a first step towards understanding the relationship between phonetic variation and perception of social identity in Spanish.

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## Appendix A: Text of Experiment Two

[First screen:]  
¡Bienvenidos al experimento!

Este experimento tiene que ver con la percepción del habla y los estereotipos. Piensa en una conversación telefónica. Muchas veces nos hacemos una idea de cómo es una persona sólo al oír su voz.

Esta idea de "cómo es" una persona puede estar compuesta de diferentes tipos de información social. Por ejemplo, en muchos casos podemos decidir inmediatamente si habla una mujer o un hombre. En otros casos, tendremos la idea que un hablante es muy simpático, o poco amable. Incluso en algunos casos tenemos una idea del aspecto físico de la persona.

Pulsa cualquier tecla para continuar.

[Next screen:]

Es cierto que estas impresiones vienen muy rápido, pero no están claros todavía los límites de la percepción y los límites de los diferentes tipos de información social. Por eso, en este experimento tendrás que pensar cómo es una persona sólo al oír una voz. No hay respuestas correctas ni incorrectas--sólo queremos saber tus impresiones.

Pulsa cualquier tecla para continuar.

[Next screen:]

La tarea del experimento es bastante fácil. Para cada muestra, sólo tienes que escuchar una voz y la computadora te dará una pregunta. Hay cuatro preguntas diferentes que se repiten a través del experimento. La voz es diferente en cada muestra, pero las voces se repiten a lo largo del experimento también.

Pulsa cualquier tecla para continuar.

[Next screen:]

Hay cuatro preguntas distintas. Las preguntas tratan de:

la clase social  
la edad  
la orientación sexual  
la altura

Pulsa cualquier tecla para continuar.

[Next screen:]

El objetivo del estudio es examinar los estereotipos del habla y las impresiones inmediatas. Por lo tanto, pedimos que responda tan rápido como puedas.

Nadie, aparte de la investigadora, tendrá acceso a los resultados en ningún momento.

Pulsa cualquier tecla para continuar.

[Next screen:]

Ahora que sabes más del experimento, tenemos unas prácticas. Si tienes una duda o una pregunta, habla con Sara. Si no tienes preguntas, pulsa cualquier tecla para empezar la práctica.

En cuanto pulses el botón, las prácticas empezarán, así que no lo pulses hasta que estés listo/a para la primera práctica.

[Next screen:]

[Practice items]

[Next screen:]

¡Muy bien! Ahora que has practicado un poco, estas listo/a para el experimento. Si tienes alguna duda sobre la actividad, pregúntale a Sara.

Recuerda que no hay respuestas correctas ni incorrectas, sólo queremos saber tus impresiones.

Cuando estés listo/a para el experimento completo, pulsa cualquier tecla.

[Next screen:]

[Experimental trial text:]

Escucha las siguientes palabras:

el día

la vida

el tiempo

la gente



el mundo

la manera

[Next screen:]

[Randomly generated question on perceived speaker characteristic]

[Following trial begins; repeats until all items are given.]

[Next screen:]

¡Gracias por participar en este experimento!  
Pulsa cualquier tecla para salir.

**Question on perceived speaker age:**

¿Qué edad te parece que tiene el hablante?

"Pon tu respuesta aquí, y pulsa 'ENTER':"

**Question on perceived speaker height:**

El hablante suena como un hombre...

- (1) mucho más alto (de altura) que el promedio.
- (2) un poco más alto que el promedio.
- (3) de altura mediana.
- (4) un poco más bajo que el promedio.
- (5) mucho más bajo que el promedio.

**Question on perceived speaker social class:**

El hablante suena como un hombre...

- (1) de clase social alta.
- (2) de clase social un poco más alta que el promedio.
- (3) de la clase media.
- (4) de clase social un poco más baja que el promedio.
- (5) de clase social muy baja.

**Question on perceived speaker sexual orientation:**

El hablante suena...

- (1) gay.
- (2) muy gay.
- (3) más o menos gay
- (4) straight/heterosexual.
- (5) ni gay ni straight/heterosexual.

## Appendix B: Mean acoustic characteristics of the stimuli

Summary of mean acoustic characteristics of the stimuli, by speaker.

Speaker ID	Mean F1 (Bark)	Mean F2 (Bark)	Est. vocal		Dispersion (Bark)
			tract length (cm)	Mean $F_0$ (ERB)	
101	3.75	12.45	14.76	3.64	2.63
102	3.82	11.94	17.8	4.05	2.91
103	3.48	12.2	13.82	4.03	2.36
104	3.6	12.42	14.99	3.47	2.58
105	3.98	12.22	13.19	3.73	2.68
106	3.73	11.8	14.38	3.59	2.35
107	3.64	11.73	15.94	3.97	2.67
108	4.73	11.92	14.68	4.25	2.5
109	3.8	11.64	18.27	3.79	2.58
110	3.53	12.08	18.05	4.27	2.35
111	3.77	11.81	21.57	3.28	2.3
112	4.12	12.13	16.29	4.18	2.57
113	3.47	12.26	17.21	4.01	3.04
114	3.25	12.44	13.79	3.98	2.53
115	4.05	12.33	14.78	3.99	2.58
116	2.96	12.48	15.31	4.71	2.71
117	3.1	12.11	14.55	4.1	2.54
118	4.14	11.96	14.93	3.8	2.47
119	3.58	12.24	13.16	4.45	2.72
120	4.06	11.78	15.73	3.86	2.34

Summary of acoustic characteristics of individual vowels, by speaker.

Speaker ID	Word	Vowel	F1(Bark)	F2 (Bark)	$F_0$ (ERB)	Est. vowel tract length (cm)	Dispersion (Bark)
101	manera	a	5.22	10.85	3.34	14.76	2.17
	gente	e	4.00	14.07	3.58	14.76	1.64
	manera	e	4.13	13.86	3.41	14.76	1.46
	tiempo	e	3.95	14.22	3.77	14.76	1.78
	dia	i	3.14	14.46	3.77	14.76	2.10
	vida	i	3.32	14.38	3.83	14.76	1.98
	mundo	u	2.52	5.31	3.79	14.76	7.24
102	manera	a	6.44	8.80	3.78	17.80	4.09
	gente	e	4.37	14.12	3.78	17.80	2.24
	manera	e	3.65	12.82	3.93	17.80	0.89

	tiempo	e	4.03	13.49	4.34	17.80	1.56
	dia	i	2.74	14.19	4.22	17.80	2.49
	vida	i	2.65	14.46	4.37	17.80	2.78
	mundo	u	2.88	5.73	3.93	17.80	6.28
103	manera	a	4.48	10.67	3.64	13.82	1.82
	gente	e	3.91	13.40	4.09	13.82	1.28
	manera	e	3.59	13.73	3.96	13.82	1.53
	tiempo	e	4.50	13.51	4.35	13.82	1.66
	dia	i	2.93	13.96	3.54	13.82	1.85
	vida	i	2.79	14.10	4.21	13.82	2.03
	mundo	u	2.16	5.99	4.44	13.82	6.34
104	manera	a	7.27	11.14	3.25	14.99	3.89
	gente	e	3.01	13.57	3.61	14.99	1.29
	manera	e	2.76	13.86	3.49	14.99	1.66
	tiempo	e	3.58	13.10	3.43	14.99	0.68
	dia	i	3.02	13.58	3.41	14.99	1.30
	vida	i	2.97	15.38	3.32	14.99	3.02
	mundo	u	2.56	6.31	3.80	14.99	6.20
105	manera	a	5.72	11.46	3.39	13.19	1.90
	gente	e	4.51	13.51	3.70	13.19	1.40
	manera	e	4.60	13.37	3.71	13.19	1.31
	tiempo	e	4.44	13.87	3.89	13.19	1.72
	dia	i	2.54	14.12	3.90	13.19	2.38
	vida	i	2.94	14.47	3.73	13.19	2.48
	mundo	u	3.09	4.73	3.78	13.19	7.55
106	manera	a	5.73	12.15	3.35	14.38	2.03
	gente	e	4.11	12.62	3.54	14.38	0.89
	manera	e	3.80	11.93	3.38	14.38	0.15
	tiempo	e	3.76	13.42	3.78	14.38	1.61
	dia	i	3.18	14.07	3.58	14.38	2.33
	vida	i	2.92	13.81	3.66	14.38	2.16
	mundo	u	2.63	4.64	3.84	14.38	7.25
107	manera	a	5.53	10.48	3.50	15.94	2.27
	gente	e	4.53	13.42	3.88	15.94	1.91
	manera	e	4.38	12.98	3.77	15.94	1.45
	tiempo	e	3.49	13.24	3.73	15.94	1.52
	dia	i	2.91	13.67	4.15	15.94	2.07
	vida	i	2.92	13.72	4.17	15.94	2.11
	mundo	u	1.70	4.63	4.57	15.94	7.36
108	manera	a	6.38	11.12	3.99	14.68	1.83
	gente	e	5.14	12.74	4.21	14.68	0.92
	manera	e	5.30	13.17	4.21	14.68	1.38
	tiempo	e	5.29	13.16	4.32	14.68	1.37
	dia	i	3.62	14.06	4.30	14.68	2.41
	vida	i	3.85	14.25	4.26	14.68	2.50

	mundo	u	3.55	4.91	4.45	14.68	7.10
109	manera	a	5.01	9.85	3.58	18.27	2.17
	gente	e	4.48	12.83	3.82	18.27	1.37
	manera	e	4.69	12.65	3.68	18.27	1.35
	tiempo	e	4.60	13.41	3.83	18.27	1.95
	dia	i	2.57	13.85	4.06	18.27	2.52
	vida	i	2.84	13.61	3.73	18.27	2.19
	mundo	u	2.37	5.30	3.85	18.27	6.50
110	manera	a	4.95	10.95	3.98	18.05	1.82
	gente	e	3.77	13.26	4.42	18.05	1.21
	manera	e	3.45	13.33	4.19	18.05	1.26
	tiempo	e	3.91	13.33	4.21	18.05	1.31
	dia	i	3.02	14.19	4.40	18.05	2.17
	vida	i	2.95	14.03	4.40	18.05	2.03
	mundo	u	2.63	5.45	4.28	18.05	6.69
111	manera	a	5.24	10.96	2.74	21.57	1.70
	gente	e	3.86	12.92	3.36	21.57	1.11
	manera	e	3.82	12.91	2.89	21.57	1.11
	tiempo	e	4.01	12.48	3.42	21.57	0.72
	dia	i	3.18	14.03	3.55	21.57	2.30
	vida	i	3.29	14.20	3.52	21.57	2.44
	mundo	u	3.00	5.15	3.49	21.57	6.70
112	manera	a	6.47	10.29	3.75	16.29	2.99
	gente	e	4.33	13.71	4.15	16.29	1.59
	manera	e	4.79	13.48	4.09	16.29	1.50
	tiempo	e	4.38	13.51	4.36	16.29	1.40
	dia	i	3.08	13.98	4.17	16.29	2.12
	vida	i	3.03	13.94	4.42	16.29	2.12
	mundo	u	2.76	6.01	4.32	16.29	6.27
113	manera	a	6.29	10.31	3.36	17.21	3.43
	gente	e	3.64	13.53	4.28	17.21	1.27
	manera	e	3.52	13.47	3.93	17.21	1.20
	tiempo	e	3.40	13.93	4.05	17.21	1.67
	dia	i	2.50	14.84	3.89	17.21	2.75
	vida	i	2.63	15.25	4.23	17.21	3.10
	mundo	u	2.32	4.53	4.30	17.21	7.82
114	manera	a	4.28	10.67	3.69	13.79	2.06
	gente	e	3.27	13.96	4.04	13.79	1.52
	manera	e	3.73	13.66	3.56	13.79	1.31
	tiempo	e	3.25	14.25	4.36	13.79	1.81
	dia	i	2.82	14.26	4.05	13.79	1.87
	vida	i	2.95	14.68	4.12	13.79	2.26
	mundo	u	2.44	5.61	4.04	13.79	6.88
115	manera	a	7.47	11.59	3.53	14.78	3.49
	gente	e	3.98	13.32	4.17	14.78	0.99

	manera	e	4.18	13.41	3.99	14.78	1.09
	tiempo	e	3.94	13.88	3.91	14.78	1.55
	dia	i	2.68	14.44	4.27	14.78	2.52
	vida	i	3.25	13.91	3.93	14.78	1.77
	mundo	u	2.88	5.77	4.17	14.78	6.67
116	manera	a	5.29	11.59	4.46	15.31	2.50
	gente	e	2.57	13.64	4.52	15.31	1.23
	manera	e	2.92	13.72	4.82	15.31	1.25
	tiempo	e	2.60	14.75	4.76	15.31	2.30
	dia	i	2.58	14.57	4.72	15.31	2.13
	vida	i	2.72	14.26	4.43	15.31	1.80
	mundo	u	2.03	4.79	5.23	15.31	7.74
117	manera	a	4.76	10.47	3.86	14.55	2.33
	gente	e	2.79	14.42	4.13	14.55	2.33
	manera	e	3.42	13.05	3.93	14.55	0.99
	tiempo	e	3.33	13.28	4.13	14.55	1.19
	dia	i	2.59	14.07	4.34	14.55	2.03
	vida	i	2.76	14.14	4.22	14.55	2.06
	mundo	u	2.04	5.34	4.13	14.55	6.85
118	manera	a	5.69	11.30	3.48	14.93	1.69
	gente	e	4.48	13.73	3.97	14.93	1.80
	manera	e	4.97	12.50	3.60	14.93	1.00
	tiempo	e	3.79	13.30	3.83	14.93	1.38
	dia	i	3.23	14.00	3.93	14.93	2.23
	vida	i	3.16	13.91	3.90	14.93	2.18
	mundo	u	3.64	4.99	3.89	14.93	6.99
119	manera	a	4.55	10.70	4.31	13.16	1.82
	gente	e	4.31	13.68	4.47	13.16	1.61
	manera	e	4.03	12.80	4.37	13.16	0.72
	tiempo	e	3.63	14.11	4.65	13.16	1.87
	dia	i	2.86	14.91	4.41	13.16	2.76
	vida	i	3.03	14.82	4.37	13.16	2.63
	mundo	u	2.65	4.68	4.55	13.16	7.62
120	manera	a	5.46	10.66	3.61	15.73	1.80
	gente	e	4.58	12.78	3.85	15.73	1.13
	manera	e	4.59	12.59	3.70	15.73	0.97
	tiempo	e	3.94	13.63	3.90	15.73	1.85
	dia	i	3.51	13.52	4.06	15.73	1.82
	vida	i	3.28	13.93	3.79	15.73	2.29
	mundo	u	3.03	5.36	4.09	15.73	6.50

## Appendix C: Text of Experiment Three

[First screen:]

Hola.  
Saludos.  
Bienvenidos.

[Next screen:]

¡Bienvenidos al experimento!

Este experimento tiene que ver con el reconocimiento de las voces y los estereotipos. Tenemos interés en la rapidez y la precisión con lo cual la gente puede reconocer las voces que acaba de oír. También queremos saber si el proceso de reconocer las voces depende de las características sociales de los hablantes.

Pulsa cualquier tecla para continuar.

[Next screen:]

[For CONDITION 1:]

En esta fase del experimento, vas a escuchar a muchos hombres. Los hombres van a pronunciar las mismas palabras, pero algunos de estos hombres suenan estereotípicamente gay, y otros no suenan estereotípicamente gay.

[For CONDITION 2:]

En esta fase del experimento, vas a escuchar a muchos hombres. Los hombres van a pronunciar las mismas palabras, pero algunos de estos hombres suenan estereotípicamente como si fueran de la clase alta, algunos suenan estereotípicamente como si fueran de la clase media y algunas suenan estereotípicamente como si fueran de la clase baja.

Para llevar a cabo el experimento, se usará el teclado (o el teclado y la caja de respuestas).

Pulsa cualquier tecla para continuar.

[Next screen:]

Cada muestra del experimento consiste en unas actividades distintas.

Primero, oirás seis palabras dichas por el mismo hablante. Las palabras aparecerán en la pantalla. Luego, se presentará una frase y tendrás que decir si la frase fue producida por el mismo hablante que en la primera parte o si fue producida por otro hablante. Debes prestar atención a las seis palabras.

Pulsa cualquier tecla para continuar.

[Next screen:]

Después de oír las seis palabras, habrá una actividad corte de conteo o de matemáticas. El propósito es poner un poco de tiempo—unos 3 segundos, más o menos—entre las palabras de la primera parte, y la frase de la segunda parte. No es una prueba de matemáticas. Sólo queremos poner un poco de tiempo entre las seis palabras primeras y la frase.

Pulsa cualquier tecla para continuar.

[Next screen:]

Después, te prepararemos para la segunda parte. En ella, pondrás el dedo en el botón del centro en la caja de respuesta. La pantalla estará roja. Cambiará a verde y, a la misma vez, oirás un tono. Cuando pase esto, pulsarás el botón del centro (el 3) tan rápido como puedas.

Pulsa cualquier tecla para continuar.

[Next screen:]

Luego de pulsar el botón del centro, oirás una frase. Pulsarás el botón de la izquierda (el 1) si es el mismo hablante que ha producido las seis palabras que acabas de oír, y el botón de la derecha (el 5) si es un hablante diferente.

Tan pronto como sepas la respuesta, pulsarás la tecla correspondiente. (No tendrás que esperar hasta que termine la grabación.)

La meta es hacerlo tan RÁPIDO y con tanta PRECISIÓN como puedas.

Pulsa cualquier tecla para continuar.

[Next screen:]

Parece complicado, ¿no? No te preocupes, vamos a hacer unas prácticas antes de empezar el experimento completo. Pulsa cualquier tecla en el teclado o la caja de respuesta para practicar.

En cuanto pulses el botón, las prácticas empezarán. Así que no lo pulses hasta que estés listo/a para la primera práctica. :)

[Next screen:]

[PRACTICE ITEMS]

[Next screen:]

Ahora que has practicado un poquito, estás listo/a para el experimento. Si tienes algunas dudas sobre la actividad, habla con Sara.

[For CONDITION 1:]

\*\*\*Acuérdate que algunos de estos hombres suenan estereotípicamente gay, y otros no.\*\*\*

[For CONDITION 2:]

\*\*\*Acuérdate que algunos de estos hombres suenan estereotípicamente como si fueran de la clase alta, algunos suenan estereotípicamente como si fueran de la clase media, y algunas suenan estereotípicamente como si fueran de la clase baja.\*\*\*

Cuando estés listo/a para el experimento completo, pulsa cualquier tecla. La primera muestra empezará en cuanto pulses el botón, así que no lo pulses hasta que estés listo/a para empezar.

[Next screen:]

[For CONDITION ONE:]

\*\*\*Acuérdate que algunos de estos hombres suenan estereotípicamente gay, y otros no.\*\*\*

[For CONDITION TWO:]

\*\*\*Acuérdate que algunos de estos hombres suenan estereotípicamente como si fueran de la clase alta, algunos suenan estereotípicamente como si fueran de la clase media, y algunos suenan estereotípicamente como si fueran de la clase baja.\*\*\*

[Next screen:]

[EXPERIMENT TRIALS]

[Experimental trial text:]

Escucha las siguientes palabras:

el día

la vida

el tiempo

la gente

el mundo

la manera

[Next screen:]

[mental math or counting exercise]



Pon tu respuesta aquí, y pulsa 'ENTER':]

[Next screen:]

Prepárate para la actividad de reconocer voces.

Primero, pulsa el botón del centro (el 3) cuando la pantalla cambie de rojo a verde y se escuche un tono.

[Next screens:]

[screen changes from red to green and a tone is heard]

[Next screen:]

¿Fue la frase que estás a punto de escuchar producida por el mismo hablante de antes, o un hablante diferente?

Pulse el botón de la izquierda (el 1) si es  
EL MISMO HABLANTE

Pulse el botón de la derecha (el 5) si es  
UN HABLANTE DIFERENTE

[Next screen:]

Siguiente muestra...

[Next screen:]

[Following trial begins; repeats until all items are given.]

[Next screen:]

¡Muchas gracias! Has terminado con el experimento.

Ahora que hemos llegado al final, te podemos decir que el experimento tiene un enfoque en las diferencias entre los estereotipos del habla de los hombres gay y los hombres heterosexuales.

Ahora que sabes el enfoque verdadero del experimento, puedes elegir que tus respuestas no sean utilizadas en el análisis, y que los datos sean borrados.

No te pasará ninguna consecuencia de la decisión, y la decisión no afectará el pago que recibes.

Si está BIEN que se usen las respuestas, pulsa la tecla 1.  
Si quieres que las respuestas NO sean utilizadas, pulsa la tecla 9.

[Next screen:]  
¡Gracias por participar en este experimento!

Pulsa cualquier tecla para salir.

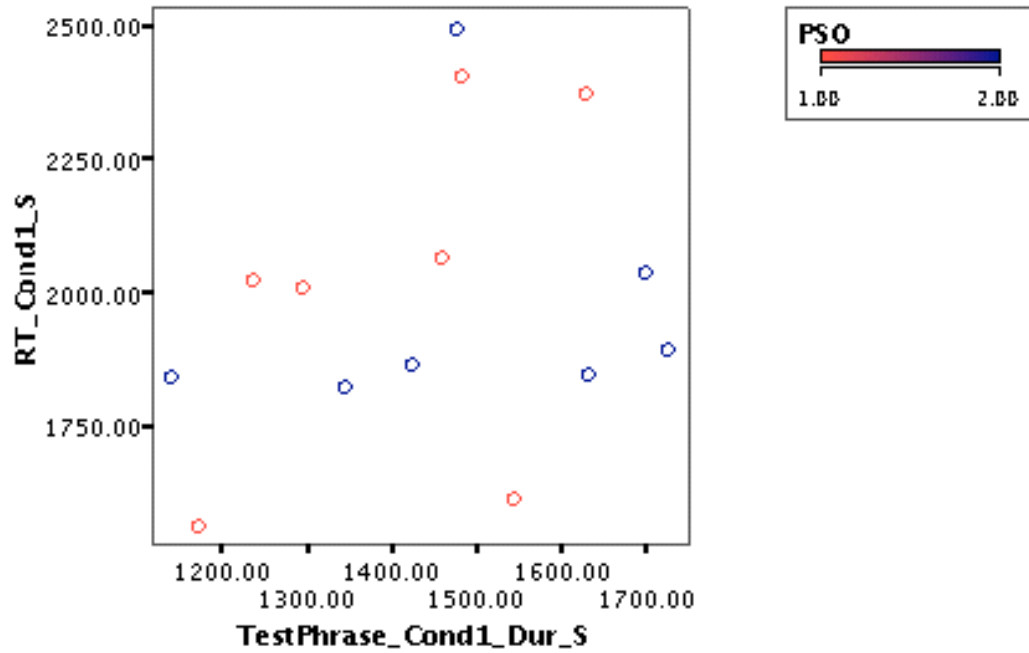
**Mental math/counting questions:**

- ¿Cuántas veces aparece la B? HEWBOBBB
- ¿Cuántos meses hay en dos años?
- ¿Cuántas veces aparece la B? EIWBOBBBSL
- ¿Cuántas veces aparece el 1? 12223131
- ¿Cuántas veces aparece la A? AHAEAAA
- ¿Cuántas veces aparece el 4? 84554344
- ¿Cuántos días hay en diez semanas?
- ¿Cuántos días hay en tres semanas?
- ¿Cuántos días hay en ocho semanas?
- ¿Cuántos días hay en cuatro semanas?
- ¿Cuántos días hay en once semanas?
- ¿Cuántas veces aparece la A? A204AAA
- ¿Cuántas veces aparece la A? AAEEAAA
- ¿Cuántos días hay en cuatro semanas?
- ¿Cuántas veces aparece el 1? 1222313441
- ¿Cuántas veces aparece el 1? 113451771
- ¿Cuántos meses hay en cuatro años?
- ¿Cuántos días hay en once semanas?
- ¿Cuántas veces aparece el 1? 1313441134
- ¿Cuántas veces aparece el 1? 891345111
- ¿Cuántos meses hay en cuatro años?
- ¿Cuántos días hay en once semanas?
- ¿Cuántas veces aparece la B? HEWBEIB
- ¿Cuántos días hay en siete semanas?
- ¿Cuántas veces aparece el 4? 433440592141490
- ¿Cuántos meses hay en tres años?
- ¿Cuántos días hay en ocho semanas?
- ¿Cuántos días hay en tres semanas?
- ¿Cuántos días hay en tres semanas?
- ¿Cuántos meses hay en cinco años?
- ¿Cuántas veces aparece la A? AHAA204AAA
- ¿Cuántos días hay en siete semanas?
- ¿Cuántos días hay en siete semanas?
- ¿Cuántas veces aparece el 4? 8884554414900
- ¿Cuántos meses hay en cinco años?
- ¿Cuántas veces aparece el 8? 8884900

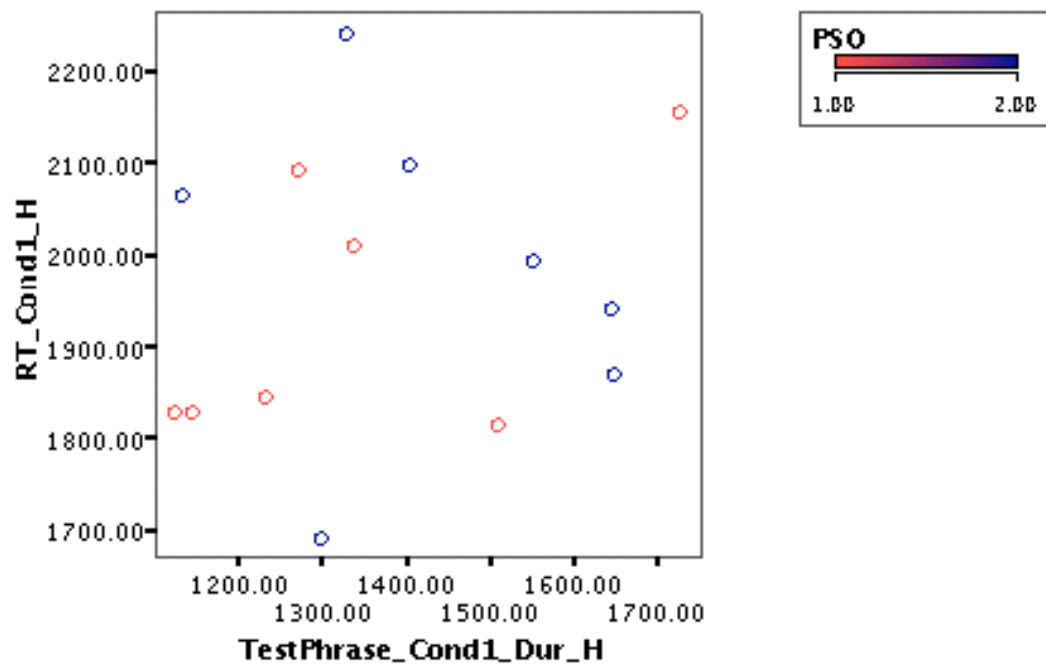
¿Cuántos días hay en ocho semanas?  
 ¿Cuántos días hay en cuatro semanas?  
 ¿Cuántas veces aparece el 5? 88558455  
 ¿Cuántas veces aparece el 1? 31134511  
 ¿Cuántos días hay en tres semanas?  
 ¿Cuántos meses hay en dos años?  
 ¿Cuántas veces aparece la J? JJIA20J4AAA  
 ¿Cuántas veces aparece el 0? 88803054900  
 ¿Cuántas W's hay? EWWOWB8927B  
 ¿Cuántas E's hay? EBWBEIEEB  
 ¿Cuántas veces aparece la 2? 2228927B  
 ¿Cuántos días hay en diez semanas?  
 ¿Cuántos días hay en diez semanas?  
 ¿Cuántas veces aparece la A? AHAE43AF4A  
 ¿Cuántos días hay en tres semanas?  
 ¿Cuántas veces aparece la B? HEWBEIWO  
 ¿Cuántos meses hay en dos años?  
 ¿Cuántas veces aparece la B? HLIWB8927B  
 ¿Cuántas veces aparece el 1? 12223134413451771  
 ¿Cuántas veces aparece la A? AHAE43AFJIA204AAA  
 ¿Cuántas veces aparece el 4? 8884554334405921414900  
 ¿Cuántos días hay en diez semanas?  
 ¿Cuántos días hay en tres semanas?  
 ¿Cuántas veces aparece la Q? QQHIQIHKKQ  
 ¿Cuántas veces aparece la F? AHAF3FJIAAAA  
 ¿Cuántas veces aparece la Q? QQHIQIHKKQ  
 ¿Cuántas veces aparece la F? AHAF3FJIAAAA  
 ¿Cuántas veces aparece la Q? QQHIQIHKKQ  
 ¿Cuántos días hay en tres semanas?  
 ¿Cuántas veces aparece el 1? 1234413451771  
 ¿Cuántas veces aparece el 1? 122251771  
 ¿Cuántos meses hay en cuatro años?  
 ¿Cuántos días hay en once semanas?  
 ¿Cuántas veces aparece el 7? 122774413451771  
 ¿Cuántas veces aparece el 9? 99987879879  
 ¿Cuántos días hay en ocho semanas?  
 ¿Cuántos días hay en ocho semanas?  
 ¿Cuántas veces aparece la B? QWERBBBSLIWBB  
 ¿Cuántos días hay en ocho semanas?  
 ¿Cuántas veces aparece el 6? 88866664900  
 ¿Cuántos meses hay en tres años?  
 ¿Cuántos días hay en ocho semanas?  
 ¿Cuántos meses hay en tres años?  
 ¿Cuántos días hay en tres semanas?  
 ¿Cuántos días hay en ocho semanas?  
 ¿Cuántas veces aparece la A? AHA204AAA

¿Cuántos días hay en ocho semanas?  
¿Cuántos días hay en ocho semanas?  
¿Cuántas veces aparece el 8? 88845548900  
¿Cuántos días hay en tres semanas?  
¿Cuántas veces aparece el 9? 998792329  
¿Cuántos días hay en ocho semanas?  
¿Cuántos días hay en cuatro semanas?  
¿Cuántas veces aparece el 4? 84401414900  
¿Cuántas veces aparece el 1? 122231771  
¿Cuántos días hay en tres semanas?  
¿Cuántos meses hay en dos años?  
¿Cuántas veces aparece la G? AGGEGA4AAA  
¿Cuántas veces aparece el S? SSKLISOPNMS  
¿Cuántas veces aparece la P? HEPPBBJPPS  
¿Cuántas veces aparece la L? EBWBLLLLB  
¿Cuántas veces aparece la V? QNVBMVVV  
¿Cuántos días hay en diez semanas?  
¿Cuántos días hay en diez semanas?  
¿Cuántas veces aparece la K? KAAKAOPIK  
¿Cuántos días hay en tres semanas?  
¿Cuántos días hay en tres semanas?  
¿Cuántas veces aparece el 4? 8834405944900  
¿Cuántas veces aparece el 3? 1222313441345  
¿Cuántos días hay en tres semanas?  
¿Cuántos días hay en tres semanas?  
¿Cuántas veces aparece la H? JHNMMHHAH  
¿Cuántas veces aparece el 2? 842892228200  
¿Cuántas veces aparece la B? BBSLIWBB  
¿Cuántas veces aparece la R? RALAFWORRJR  
¿Cuántas veces aparece la C? MKVCCADCBB

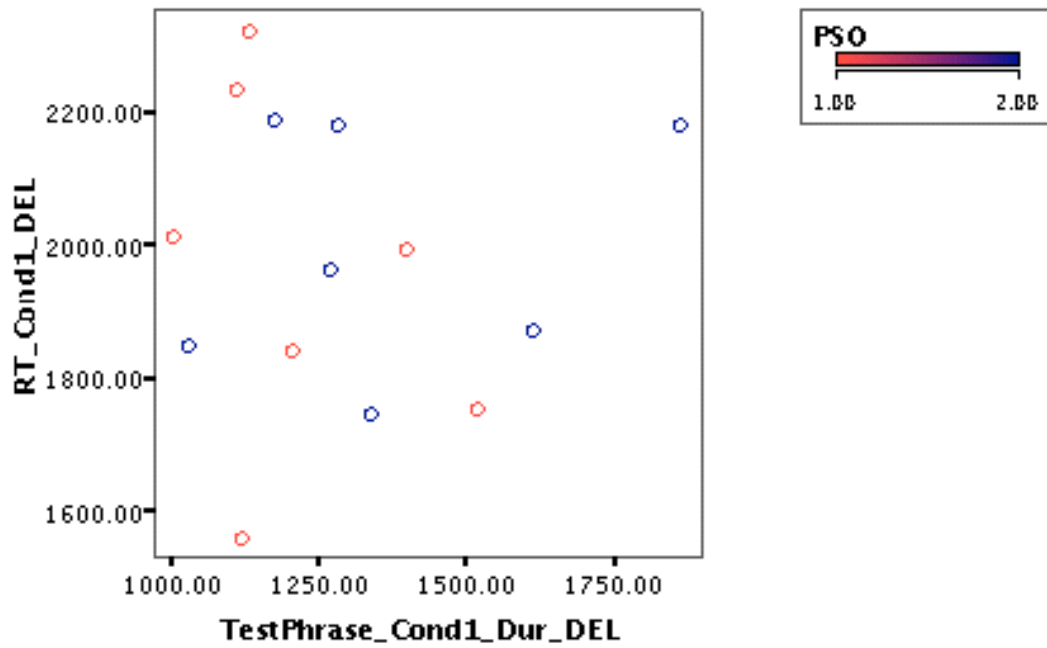
**Appendix D: Plots of mean response times and /s/ types**  
CONDITION 1, [s], by Talker average



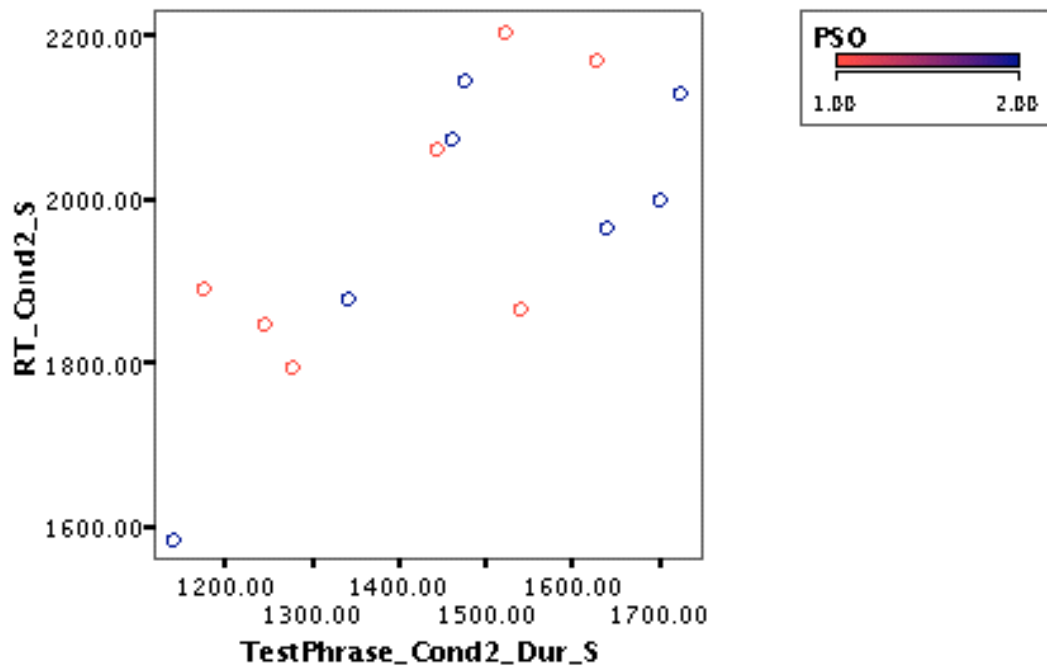
CONDITION 1, [h], by Talker average



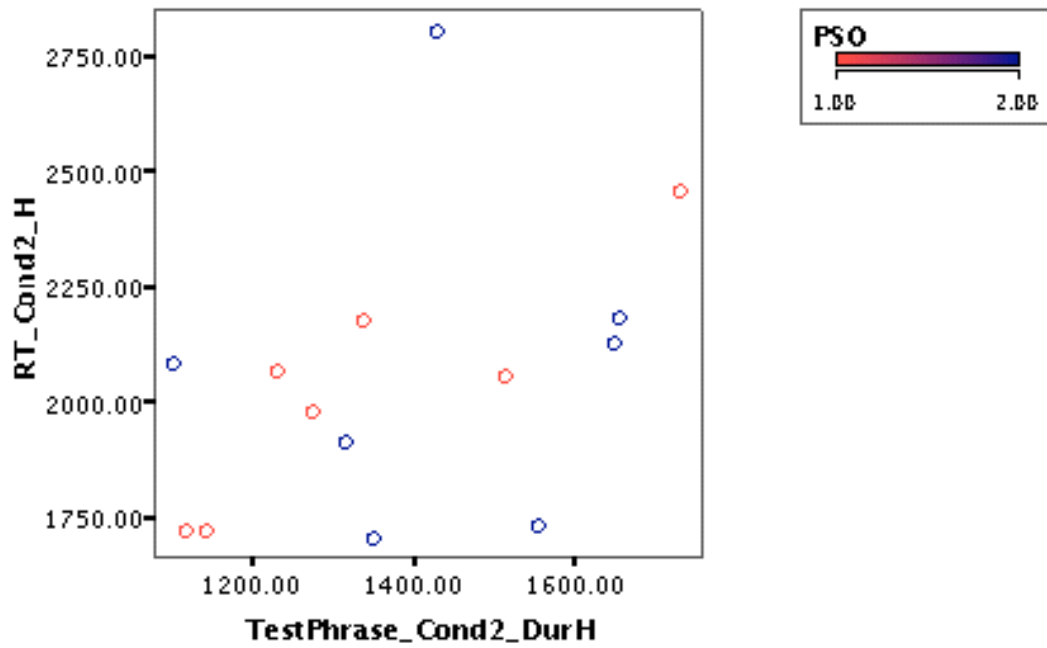
CONDITION 1, deleted, by Talker average



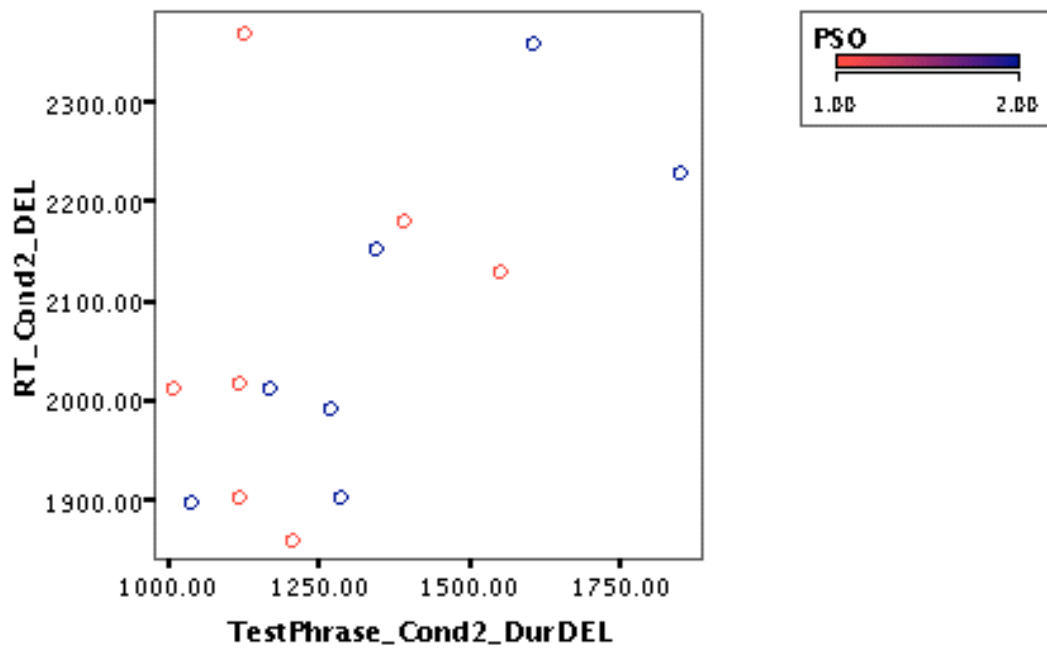
CONDITION 2, [s], by Talker average



CONDITION 2, [h], by Talker average



CONDITION 2, DEL, by Talker average



All RTs, By Condition and /s/ type

Key:

1.00 1 = [s] in Condition 1; 2.00 1 = [h] in Condition 1; 2.00 1 = DEL in Condition 1;  
1.00 2 = [s] in Condition 2; 2.00 2 = [h] in Condition 2; 3.00 2 = DEL in Condition 2

