

VOICES IN TRANSITION: TESTOSTERONE, TRANSMASCULINITY, AND THE GENDERED
VOICE AMONG FEMALE-TO-MALE TRANSGENDER PEOPLE

by

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Voices in Transition: Testosterone, Transmasculinity, and the Gendered Voice among Female-to-Male Transgender People

Dissertation directed by Associate Professor Kira Hall

This dissertation is based on a long-term ethnographic and sociophonetic study of 15 transgender people on the female-to-male (or *transmasculine*) identity spectrum. The focus of the study is the way these individuals' voices change during the first 1-2 years of masculinizing hormone therapy, which brings about a drop in vocal pitch along with other salient physiological changes. Based on regular recordings of participants during a one year period, the analysis tracks changes in fundamental frequency as well as formant frequencies and the acoustic characteristics of [s], each of which has a different place in biology-driven theories of gender and the voice. In addition to ostensibly hormonally driven changes to speakers' available fundamental frequency range, I present evidence that these speakers are engaged in various types of articulatory shifts as part of their gender role transition, which affect both formants and [s]. However, I argue that changes in all three of the phonetic domains examined here must be situated in both sociocultural and linguistic context, even where biology appears to play a significant role. The analyses presented, which include attention to both intra- and inter-speaker variation, draw on a multilayered understanding of gender derived from transgender people's own distinctions between gender assignment, gender role, gender identity, and gender presentation. My speakers' metalinguistic commentary on gender and the voice further elucidates the constellations of phonetic features that combine to create their cohesive gendered speaking styles. Ultimately, I focus on the ways that changes in one phonetic variable, like pitch, can recontextualize other elements of a speaker's linguistic style, like the acoustic spectrum of [s]. This connection drives home the necessity of considering the relationship between linguistic characteristics, rather than treating them as entirely separable variables. Attention to stylistic wholes, over individual variables, points us toward the notion that transmasculine individuals do not engage in across-the-board masculinization, but rather bring together acoustic characteristics acquired from disparate

sources in order to construct phonetic styles that reflect their complex affiliations with manhood, maleness, and masculinity.

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CHAPTER 1

INTRODUCTION TO VOICES IN TRANSITION

1.1 Introduction

This dissertation combines sociophonetic and ethnographic methods in order to explore the relationship between gender and the voice among transgender speakers. It is based on a longitudinal study of 15 transgender individuals in the San Francisco Bay Area during the first 1-2 years of their gender role transitions. Participants in the study all fell somewhere on what they refer to as the *transmasculine identity spectrum*, a term that encompasses people who were assigned to a female gender role at birth, but who self-identify as men or with some other masculine gender category. These speakers were also in the early stages of testosterone therapy, which is known to bring about a marked drop in vocal pitch as well as many other forms of physiological masculinization (Gorton, Buth & Spade 2005). I track the changes that happen in 10 speakers' voices over the course of a year as a form of intra-speaker variation, as well as examining inter-speaker variation across these individuals and five others who were unable to complete a full year of recordings. My acoustic analysis is centered around three characteristics that have been linked to gender differences in the voice among speakers of American English: fundamental frequency (i.e. pitch), vowel formants (i.e. vocal tract resonance), and the acoustics of the sibilant consonant [s]. The explanations that have been offered for gender-driven patterns in previous research on these variables have invoked different combinations of biophysical and social processes. In this research, the strongest evidence for a physiology's emphasis on the voice comes from fundamental frequency, while the [s] appears to have little, if any, basis in biological sex.

The questions that inform this study concern the nature of gendered phonetic styles, with a focus on these three acoustic characteristics. My primary goal is to ask which of these traits can change over time for transmasculine people in transition, how they change, and why. That is, to what extent can the biological effects of testosterone be invoked to explain these shifts, and to what extent should we look to sociocultural factors like language socialization (Schieffelin & Ochs 1986) and the negotiation of intersubjective identities (Bucholtz & Hall 2004, 2005)? Just as many social scientists have turned to transgender people in order to better understand gender as it operates for more normatively gendered subjects (starting with Garfinkel 2006[1967]), we can also consider how the changes that occur – or do not occur – for transmasculine speakers to inform our conceptualization of the gendered voice among all speakers, trans or otherwise. Ultimately, I demonstrate that the stylistic changes captured in this study support more socially-grounded explanations for gender differentiation in the voice than have been previously offered in acoustic studies. Beyond distinguishing social gender from biological sex and sexual orientation, I argue that all three of these constructs must be complexified in order to account for the voices of transmasculine people. To accomplish this, I turn to in-group distinctions made by my participants between gender assignment, gender role, gender presentation, and gender identity, along with some of the more flexible and nuanced ideas about biological sex and sexual orientation I have observed in transmasculine communities. I highlight the diverse forms of masculinity taken up by the transmasculine people in this study, which is reflected in the range of phonetic styles they employ. Rather than assuming that trans people universally strive toward gender normativity, I argue that transmasculine speakers use the linguistic resources available to them to construct cohesive gendered styles that reflect their complex and variable relationships to concepts like *men*, *maleness*, and *masculinity*.

One of the most important contributions of this dissertation is the way it problematizes the categorization of voices as female or male. Each of the three acoustic variables in focus in this work shows significant flexibility, which undermines deterministic accounts of gender differences between men's and women's voices that emphasize either biology or early life socialization. The alternative perspective on the relationship between gender and the voice presented in this dissertation has important

implications for sociolinguists and phoneticians alike, ranging from broad-scale theories of how gender differences in the voice arise down to the way we write scripts for acoustic analysis. When we think about voices as cohesive sociolinguistic styles constituted by numerous characteristics imbued with gendered meaning, it becomes less clear precisely which qualities make a voice “female” or “male.” When generalizations about women’s and men’s voices are made, certain kinds of speakers are treated as representatives of women and men in general, without regard for the huge variation captured by these kinds of generalized labels. In the same vein, if we recognize the multiple layers of gender I discuss in chapter 6 (assignment, role, identity, and presentation) and the complexities of each, one dimensional binary categorization schemas for our speakers’ genders and sexualities become less tenable.

Given the significant changes I document in my speakers’ phonetic styles, this study also has important implications for the way we understand the acquisition of sociolinguistic variation. On the one hand, numerous studies have shown that exposure to a dialect early in life can have a lasting effect on the way one speaks later on (e.g. Payne 1980, Tagliamonte & Molfenter 2007). At the same time, however, an increasing number of studies have begun to document the way changes occur in individuals’ voices throughout the lifetime (e.g. Harrington 2006, Sankoff & Blondeau 2007), also with a focus on dialectal variation. Yet similar studies of change over time have not been conducted on linguistic features that serve as the primary indices of speaker gender. The analysis I present in chapter 6 underscores both of these points: early life experience has lasting importance, yet change is entirely possible across the lifespan. The changes my speakers undergo cannot be explained simply by virtue of their use of testosterone. In fact, even in those cases where biology does clearly play a role – as with fundamental frequency – biophysical processes are mediated by social ones. The study thus allows us to consider the kinds of social contexts that can bring about major changes in the voice, as well as the extent to which change is possible when it comes to gendered phonetic styles.

Finally, this dissertation contributes to the study of the linguistic practices of transmasculine people, who remain largely absent from the sociolinguistic literature (with exceptions like Papp 2011 and Hazenberg 2012; and in other cultural contexts Hall 2010, Blackwood forthcoming on Indian and

Indonesian female-assigned masculine people). The voice is among the most highly salient indices of gender, and has an important place in the experiences of trans people regardless of whether they make use of testosterone. As part of negotiating a change in perceived gender, transmasculine voices reflect – and partially constitute – speakers’ alignments and disalignments with various normative and non-normative masculinities.

The goal of the next section of this introduction is to familiarize the reader with some the linguistic, historical, and cultural contexts in which the participants in this study are situated. I turn first to some basic terminology that will be invoked throughout this dissertation. This is followed by a brief account of the emergence of transgender identity, which serves as the conceptual foundation for the transmasculine identities expressed by speakers in my study. Rather than treating *transgender* as a catch-all umbrella label which can be applied to all people who challenge dominant gender norms, I follow Valentine (2007) and others in recognizing transgender as an historically- and culturally-bound identity that rests on particular conceptualizations of sex, gender, and sexuality. However, I also make use of a newer term, *transmasculine*, which is the umbrella label of choice in the communities in which I worked. I also discuss the process of *transitioning*, which refers to the practices through which a person shifts from one gender role (or type of embodiment) to another, and how transition-related resources in the Bay Area have allowed a diverse group of people access to medical services like hormone therapy. As a result, local trans communities orient to a diverse set of identities – including *transsexual*, *transgender*, and *genderqueer* – that are always fluid and potentially overlapping. I close the introduction with a preview of the chapters that follow.

1.2 Transgender and transmasculine identities in context

When I suggested that the term *transgender* is often defined as an “umbrella label,” I meant that it is said to include people from a wide range of communities and identities on the basis of their shared departure from the gender norms for their assigned sex. This practice of lumping together non-normative gender expressions as “transgender” has been problematized, however – most thoroughly in David Valentine’s

(2007) ethnography of transgender as a social category. Valentine documents how, in the 1990s, this word began to be applied (by social service agencies, for instance) to a wide swath of individuals – many of whom did not describe themselves as transgender, but were identified as such on the basis of their participation in certain gendered practices. For the subjects of Valentine’s New York City fieldwork, who were all assigned to a male gender role at birth, the practices that resulted in them being identified as transgender by institutions like HIV/AIDS outreach organizations typically included wearing wearing “women’s” clothing, making use of hormones or other forms of feminizing body modification, or being referred to with female pronouns. The discourses surrounding transgender identity that had gained institutional legitimation at that time maintained that gender identity and sexual orientation were completely separate, such that *transgender woman* and a *gay man* are mutually exclusive identities. Yet Valentine shows how an insistence on this particular idea about transgender identity, which is drawn from white, middle-class transsexuals’ experiences, erases and delegitimizes those who understand their departure from gender norms differently. The key example in Valentine’s text is the people of color who participated in drag ball culture (i.e. dance-based competitions in which participants are judged on their performances of particular gender archetypes). He shows how self-identified femme queens, for instance, may think of themselves simultaneously as women and as gay men, which bucks the logic that now pervades discourses about transgender identity. Because they were identified by others as falling under the transgender umbrella, femme queens’ identities were subject to criticism from community members and allies who saw *woman* and *gay man* as incompatible positionalities. Importantly, those whose experience is elided by the logic of *transgender* are, unsurprisingly, also among the most socially vulnerable and marginalized members of the so-called transgender community as young, poor people of color (see also Roen 2001). A related critique was launched by Towle and Morgan (2002), who focus more specifically on the impact of extending the trans umbrella to gender identities and behaviors that appear non-normative to Westerners – e.g. third/fourth gender roles in indigenous cultures. These authors show that activists’ desire to legitimate transgender identity by locating its equivalents in other cultures and points in history has the effect of locating indigenous cultures as a kind of “primordial location”

(2002:477) while erasing the diversity that exists across different cultural traditions' in terms of how third and fourth gender categories are enacted and understood (see also Massad 2002 on the Gay International). Among members of the transmasculine communities I have observed in the San Francisco Bay Area and other metropolitan areas in the United States, *transgender* is not, in practice, used as an umbrella term. Instead, its de facto definition is a person assigned to one gender role but who self-identifies with the "opposite" gender. Transgender and its alternatives are categories with specific histories – and recent ones at that. In order to understand how my research participants' identities have come into being, it is useful to spend a bit of time considering the history from which their understandings of trans identity have emerged. The historical background in this section is derived from Stryker (2008a), as well as Valentine (2007) and Meyerowitz (2002).

Before going into historical detail, a few terminological points should be addressed. When referring to my research participants, my policy is to defer to their own self-labeling to the greatest extent possible. I make this choice as a basic sign of respect, but also because I aim to capture the way members of local transmasculine communities understand their own identities. As I show in later chapters, the kind of locally driven understanding of sex, gender, and sexuality I employ is necessary in order to understand the results of my acoustic analysis. Though I discuss the development of transgender identity in this section, not all of the individuals who participated in this study call themselves transgender. The label that all of my participants do share comfort with is *transmasculine*, as I mentioned, which includes transgender men as well as others assigned to a female gender role at birth who define their identity in terms of masculinity. *Transmasculine* is a relatively recent terminological development that captures the fact that even as some of the speakers in this project describe themselves as trans men, others use different labels, like *genderqueer*, which signals an identity that is neither strictly male nor strictly female. All of these individuals, however, share a preference for the pronouns *he* and *him*. As an umbrella label, *transmasculine* has some of the same shortcomings as *transgender* in that the terms are defined in ways that include some who do not use the words to refer to themselves, and both reflect certain types of

identities better than others.¹ However, *transmasculine* is a useful word in that it recognizes the diverse identities that participants in this study articulate. In chapter 6, I provide details on the specific identities expressed by these speakers. For the time being, it is useful to know that I will talk about trans people as being *assigned to a (fe)male gender role at birth*, or as *(fe)male-assigned* rather than relying on biology-driven language (e.g. saying someone was *born (fe)male*). When I speak about *gender identity*, I am referring to participants' self-defined status as women, men, or members of another identity available within their communities. To mark the unmarked category, I describe people whose gender identity matches their assigned gender as *non-trans* or, less often, *cis*.²

The development of transgender, transmasculine, and genderqueer identities is a product of increasingly rapid social change in the conceptualization of gender and sexuality that has happened over the past century and more. Stryker's (2008a) *Transgender History* begins at the middle of the 19th century, when attention to gender and sexual transgression in the United States took on a new, public character when many jurisdictions enacted laws against cross-dressing for the first time. In 1863, San Francisco was among them when it outlawed public nudity and wearing "lewd dress" or clothing "not belonging to [the wearer's] sex" (Stryker 2008a:32). Increased attention to transgressions of norms for gendered clothing³ manifested in greater policing and institutional scrutiny directed at individuals

¹ Community members who reject *transmasculine* as an umbrella label point out two other problems with the word. First, it suggests that all trans people who were assigned to a female gender role must be "masculine." In chapter 5, I discuss some of the fact that one of my participants, whom I call Dave, identifies as a man but also describes himself as *fem* rather than masculine. Other trans men dislike the term because they see themselves primarily as men and feel that *transmasculine* places them in a kind of third gender category.

² *Cis-* is the Latinate prefix that serves as the opposite of *trans-* (e.g. in the grammatical terminology that distinguishes *translocatives* ['over there'] from *cislocatives* ['over here']). *Cis-* means 'on the same side as', and many transgender people have picked up on this term by creating the words *cisgender* or *cissexual* to refer to those who identify with their assigned gender and sex (see Serano 2007 for more). Some trans people prefer the term *cis* to *non-trans* because it creates a distinctive term for the unmarked category, while others prefer *non-trans* because it uses trans people as the standard by which others are defined (i.e. it has the reverse power implications of a term like *non-white*, in which people of color are defined by virtue of their relationship to the dominant group).

³ Notably, anti-cross-dressing laws also targeted feminists who characterized the era's restrictive dress code for women as a form of "bondage" (Stryker 2008a).

engaging in these practices. At the same time, though, these discourses ultimately led into a kind of recognition that has been central to the formulation of contemporary queer identities, as Foucault (1978) describes. Rather than silencing and eliminating sexual deviance, prohibitions against engaging in – or so much as talking about – such non-normative behavior created a proliferation of discourses on the subject. Foucault’s account of the history of sexuality connects the persecution of certain kinds of gendered and sexual practices, including cross-dressing, to the creation new categories of persons like *the homosexual*. Among these discourses about sexuality that emerged at this time were medicalized descriptions of homosexuals and others that appeared in the late 19th century. At that time, German sexologists such as Karl Heinrich Ulrichs, Magnus Hirschfeld, and Richard von Krafft-Ebing began to treat same-sex attraction and cross-gender identification as a legitimate subject for scientific inquiry. Despite the fact that the research pathologized the various categories it documented (and in so doing helped to create), German sexology at the turn of the century also legitimized research subjects’ positionalities in ways that could be co-opted by those who self-identified with categories like *homosexual*. These scholars and their colleagues believed that attraction to the same sex, identification with the “opposite” sex, and other stigmatized feelings or practices with respect to gender and sexuality were driven by in-born desires. On this basis they argued that laws against homosexuality and cross-dressing should be reformed. As surgery became safer around the turn of the 19th century, people began to contact these doctors for help finding a way to transform the sexual characteristics of their bodies, and Hirschfeld ended up arranging the first documented sex reassignment surgery in 1931 (Stryker 2008a:39). Ulrichs seems to have been the first to define trans identity in terms familiar to us today. He describes certain individuals (including himself) with the German noun *Urning*,⁴ defined as those with “a female soul enclosed within a male body” (*anima muliebris virili corpore inclusa*; Stryker 2008a:37). This particular metaphor for disharmony between internal and external selves remains wide-spread among trans people today (see Prosser 1998 for a careful discussion of transsexual “body narratives,” as he calls them) – though it has certainly been

⁴ Ulrichs coined this term as a reference to the planet Uranus, motivated by a complex allusion to Plato’s *Symposium*, which linked Uranus to the mixture of male bodies and female souls.

challenged as well. Sadly, the research happening at Hirschfeld's institute for sex research in Germany was derailed by the rise of the Nazi party.

The work started in Germany around the turn of the century was picked up again in post-WWII America, largely due to the work of Hungarian endocrinologist Harry Benjamin, who was first introduced to cross-gender phenomena by Hirschfeld. Eventually, Benjamin became one of the most influential scientific figures in the history of American trans communities, and is credited with popularizing the term *transsexual* in his (1966) book, *The Transsexual Phenomenon*. He was also a key advocate in the push to provide sex reassignment surgery for patients who, he believed, could benefit from it. Rather than trying to change trans people's minds to match their bodies, he argued that it was more effective to change patients' bodies to match their minds. Though it took several decades, doctors in the US were eventually convinced that sex reassignment was not an inherent violation of their oath to do no harm (and, perhaps more importantly, that it would not leave them open to legal retribution). Clinics offering sex reassignment-related services began to appear in the US in the 1960s, the first of which was opened by Benjamin at Johns Hopkins University. By the end of that decade, these Gender Identity Clinics, as they were sometimes called, had opened in several metropolitan areas across the country. The clinics served as centralized sites for the various interventions provided to trans people: psychological assessment, hormonal treatment, and surgical consultations could all be handled through the same institution. They also functioned as centers for research on transsexuality. Patients had a strong incentive to participate in the clinics' research projects because doing so freed them from the obligation of paying for treatment that might otherwise be financially out of reach.

An important product of Benjamin's research agenda was the establishment of the Harry Benjamin International Gender Dysphoria Association (now known as the World Professional Association for Transgender Health, or WPATH), which developed a set of Standards of Care for professionals seeing patients who want to modify the gendered characteristics of their bodies. The Standards of Care (SOC), based on the principles originally outlined by Benjamin (1966), enshrined a gate-keeping process that privileged psychologists' evaluations over patients' self-assessments. The SOC

also included a series of tests and benchmarks patients were expected to meet, most notably the so-called “real life test,” which required trans people to live as members of their self-identified gender for one year prior to beginning hormone therapy or having surgery. The SOC have been reformulated several times since their initial publication in 1979, and are today more flexible, though psychologists’ and doctors’ roles as gatekeepers remain intact (see Speer & Parsons 2006). Benjamin and his colleagues were also instrumental in the inclusion of Gender Identity Disorder (or GID) in the 3rd edition of the *Diagnostic and Statistical Manual of Mental Disorders* used by psychologists (American Psychiatric Association, 1980). Both the SOC and the diagnostic criteria for GID were foreshadowed by Benjamin’s (1966) delineation of the “true transsexual” from other types of non-normatively gendered people that might be encountered by a clinician, such as cross-dressers. The true male-to-female transsexual, according to Benjamin, has a feminine personality; is not satisfied to simply dress in women’s clothes and instead feels the need live and be recognized by others as a woman; has a low libido and is either asexual or desires to have heterosexual sex with men; is not aroused by wearing women’s clothing; desires hormonal treatment and genital reconstruction; and despises any “male” body parts. The language entry on GID in the fourth edition of the *DSM* (1994) further describes transsexuals as having long-term discomfort with their assigned gender and long-term identification with the “opposite” gender.

The creation of diagnostic criteria changed the relationship between doctors and patients seeking to modify their sex in significant ways. Ostensibly, the SOC and guidelines for GID exist to prevent people from changing their bodies in ways they might come to regret if anyone could simply choose to make use of sex-changing hormones or surgery on demand.⁵ The existence of clear criteria doctors could use to distinguish the certifiable transsexual from the confused or unstable may have also affected the willingness of doctors to take on trans patients. If it could be demonstrated that certain patients suffered

⁵ Importantly, non-trans people do not go through the same kind of intense gatekeeping to which trans people have often been subjected, even for access to identical procedures (e.g. breast augmentation). Despite the fact that a non-trans woman might regret getting breast implants, she is not required to pay for a year of therapy beforehand, for instance, to show that she is certain about her decision. Instead, she is treated as capable of making this decision on her own because she is choosing to enhance her gender normativity rather than diminish it.

from an ailment that is known to benefit from a particular treatment, surgeons and other providing medical care might avoid the claim that they were simply indulging the delusions of the mentally ill. From a different perspective, the construct of GID reigned in the possibility of upheaval of the gender system. If just anyone could access to the procedures and treatments sought by trans people – even if they had no intention of changing gender roles, for instance, or had physical and/or social androgyny as their goal – the gender binary might be damaged or undermined entirely. The gate-keeping system established by Benjamin and others thus also had the effect of circumventing the subversive potential of sex-changing medical technology. The result was that only some people seeking to transform their bodies would be provided with the means to do so.

In many ways, these diagnostic systems represent codifications of prevailing gender norms at the time they were written. For instance, according to Benjamin's (1966) treatise, a transsexual with "feminine" personality traits is shy, compliant, and emotional (p. 15). Bolin (1986) reports on the sexism built into gate-keepers' evaluations of trans patients, the most egregious example of which is the practice – which is no longer sanctioned – of doctors using their own sexual attraction toward their patients (or lack thereof) as an indicator of their fitness for transition. The notion that "true" transsexuals are exclusively attracted to members of the "opposite" gender (based on their self-identified gender category, i.e. trans men are attracted only to women and trans women only to men) reveals the presumption that gay/bisexual men are somehow not fully male and lesbian/bisexual women not fully female. Lou Sullivan, a trans man who was a well-known Bay Area activist in the 1980s, campaigned for the reform of these guidelines after being denied transition services at the Stanford clinic due to his openly gay orientation. Though he did not live to see the change, it was in part thanks to Sullivan's efforts that in 1994 the Standards of Care were revised to open the doors for openly gay, lesbian, and bisexual trans persons who wished to transition (Stryker 2008a:120). The changes have come slowly, but the SOC have evolved over time to reflect changes in our understandings of gender itself.

Sullivan is an example of a trans person who was rejected from services at a Gender Identity Clinic because of his honesty, but he was fortunate enough to find (and afford) physicians in independent

practices in late 1970s San Francisco who would provide the hormonal and surgical services he desired. For many people, however, the clinics were their only real chance to access hormones and surgery, and the stakes were high: as Benjamin himself noted, suicide is a major risk for transsexuals who are unable to transition. As a result, it wasn't long before people seeking to pass through the gate-keeping system learned the diagnostic system and began to incorporate it into the narratives they presented to psychologists, whether or not they felt it represented their experiences (Bolin 1987; see also Zimman 2009 for more discussion of trans people's narratives). Discursive psychologists Mason-Schrock (1996), Tewksbury and Gagné (1997) and Parsons (2005) have argued that narratives of gender identity elicited from trans people typically invoke authenticating moves that resemble these classic narratives as they appear in the gate-keeping setting; for instance, narrators may point to their childhood toy preferences or current gendered hobbies as evidence for the validity of their self-identified genders. These authors have joined other social scientists (e.g. Shapiro 1992, Lorber 1994, Hausman 1995; Finn & Dell 1999) in arguing that transsexuals – sometimes defined in oppositional contrast with transgender people – have highly traditional and essentialized ideas about femininity and masculinity. Mason-Schrock (1996), for example, focuses on the way transsexuals he recruited from a psychologist's support group selectively interpret their childhood experiences to fit a certain type of gender narrative, thereby constructing a legitimately gendered construction of a "true self." Of course, all narratives involve the re-imagining of past experiences according to the exigencies of the present (e.g. Bauman 1985), and in all likelihood some trans people honestly feel that the archetype of the "true transsexual" matches their life's experience. But one important point that these authors have not considered is the ongoing pressure placed on trans people to authenticate their identities to institutional figures such as psychologists like Mason-Schrock.

The narrative goes like this: a trans person knows from a young age that they are not meant to be a boy/girl, despite others' perception of them – perhaps there was some kind of mistake. They likely spent each night hoping that they would wake up the next morning with a different body. They always found themselves romantically and sexually attracted to members of the "same" sex, while preferring the friendship and activities of members of the "opposite" sex. The earlier these patterns emerged, the

stronger the patient's claim to an unchangeable gender identity. It was also important that sexual desire played no role in the desire to transition, though this was mainly considered a risk in people transitioning from male to female. While cross-dressers may achieve sexual gratification through wearing women's clothing, transsexual women should have no association between femininity and sexual arousal. For the true transsexual, intense distress over the gendered characteristics of the body create a desire for hormonal treatment, genital surgery, and any other procedure that might be needed to produce a normative male or female body. While conveying the depth and persistence of their desire to change their bodies, trans people must also be careful not to suggest that they are emotionally or psychologically unstable, which could be a counter-indication for medical treatment of GID.

The construction of transsexuality I have presented thus far is what many have described as the pathologization of trans identity. Much has changed in terms of the implementation of the gate-keeping system, and particularly in the Bay Area it is possible to go through the medical transition process without ever seeking approval from a psychologist. However, the pathologized model continues to hold sway. First and foremost, GID continues to be defined as a mental illness. Despite attempts by activists to remove it from the *DSM*, as was done for homosexuality in 1980, Gender Dysphoria will remain in the fifth revision of the manual when it appears in 2013.⁶ For many trans people, medical interventions of various types are strongly desired, making it more difficult to disavow the medical establishment in the way GLBQ communities have been able to do as part of their efforts to depathologize same-sex desire. The close relationship between trans people and the institutions that treat them is reflected by the fact that the narratives that were once required of transsexuals to pass through the gatekeeping process are still a source of legitimation among both the professionals who serve trans populations and among community members themselves (Zimman 2009).

⁶ Some trans people maintain that, despite the problems with viewing trans identity as inherently disordered, it is advantageous to maintain GID as a diagnosis for the present time. This is because the movement to have health insurance cover trans-related care is still in its early stages, and without a diagnosis it might be more difficult to argue that sex-changing medical interventions are medically necessary rather than elective or cosmetic.

The pathologization of transsexuality has been rejected by many trans people, even if they may also “play the game” in the presence of gate-keepers in order to get access to medical intervention. It is from this rejection that the word *transgender* emanated. In the 1960s, we find the first uses of *transgender* as a counter discourse to transsexuality, but it isn’t until the 1990s that the term came into widespread use. In its earliest appearances, the noun *transgenderist* (which is no longer in wide circulation) described someone who crossed the social gender boundary by living in the gender role “opposite” the one they were assigned, but who did not make use of the medical technology offered to transsexuals. Virginia Prince, who was instrumental in early organization of male-to-female cross-dressers who were married to women, was among the first advocates of a distinct transgender identity. The delineation between *transgender* and *transsexual* worked to signal a change in gender, rather than a change in sex. *Transgender* remained in use as an in-group term until the late 1980s and early 1990s, when it was reincarnated and quickly disseminated in the heights of queer theory. The new *transgender* was offered not as an alternative to transsexual body modification, but as an alternative to compulsorily gender normative transsexual identity. The advocates of *transgender* were community activists Holly Boswell (1991, 1998), Sandy Stone (1992), Leslie Feinberg (2006[1992]), and Susan Stryker (2006[1994]), who in part were responding to (and in some cases affirming) the argument that transsexuals do more to reinforce gender norms than to unseat them. “The transgender alternative,” as Boswell called it, promised to redeem trans identity as a sign of gender subversion and foreshadower of the dissolution of the gender binary.

Importantly, this transgender turn arose from within the trans community. Even as transgenderists positioned themselves initially as distinct from transsexuals, the new transgender cause has often been championed by people who could be classified as transsexuals on the basis of their embodiment. In the intervening decades, one could say that the transgender critique has been successful in the sense that there is no longer such a strict divide between those who label themselves *transgender* and those who prefer the term *transsexual*; many people use both. Nor is there as strong an insistence on the part of gate-keepers that transsexuals be pinnacles of gender normativity, as changes in the Standards of Care reflect. This

reflects a broadening of transsexual identity to include those with less normative understandings of gender and a wider range of desired forms of embodiment, which is what *transgender* evoked at the time of its resurrection. As Valentine (2007) discusses in depth, *transgender* in the 1990s took on the umbrella definition I mentioned at the start of this introduction, particularly among social service providers, activist organizations, and academics. The transgender umbrella purportedly includes transsexuals, transgender persons, people who identify as neither male nor female, performers like drag queens and kings, and sometimes even those who are identified as masculine women and feminine men. As Valentine shows, this is quite different from the various ways people under the umbrella categorize themselves and one another. In the transmasculine communities I have observed, which are dominated by trans men, there is no clear and consistent distinction made between *transgender* and *transsexual*, a blurring that appears to have been in its early stages during Valentine's fieldwork in the late 1990s. Both terms can be used in reference to those who do not identify with their assigned gender and instead pursue some form of transition – whether through medically induced changes or a shift in social role only – toward a different gender category. Today, in the communities where I conducted my research, the shortened ambiguous form *trans* is far more popular than either *transsexual* or *transgender*, which sidesteps the need to choose between the two. One could say that the line between these two categories has always been particularly blurry for transmasculine people because trans men are less likely to pursue genital surgery than trans women. For many years, then, there has been a sizeable contingent of people who transition from female to male and describe themselves as transsexuals but opt to forego major genital reconstruction. Despite not having conventionally male genitals, these individuals do not see themselves as less transsexual, less masculine, or less male than trans men who do have these procedures (Zimman forthcoming for more on transmasculine embodiment). At the same time, female-assigned people who adamantly do not identify as men, and would not describe themselves as transsexual, may nevertheless take testosterone and make use of the same surgical procedures pursued by those who do call themselves transsexual men.

The subversive definition of *transgender*, which aimed to upset the gender binary transsexuals were said to uphold, has in some ways been replaced in transmasculine communities by a newer term,

genderqueer. Taking its name from the resignification of *queer* in reference to a fluid set of potentially uncategorizable forms of non-normative sexuality, self-identified *genderqueers* are those who see themselves as neither male nor female, as both male and female, or as some other gender identity all together. Being genderqueer, however, is not incompatible with being trans; in fact, it isn't at all clear where the line between *trans* and *genderqueer* should be drawn, if it should be drawn at all. The participants in my project occupied a wide range of positions with respect to older and newer conceptualizations of trans identity. Grounded in the history and terminology established in this introduction, chapters 3, 4, and 6 delve further into the ways transmasculinity is realized in the communities that are the focus of my study.

1.3 Outline of the dissertation

Following this introduction, the meat of this dissertation begins with a review of the literature on gender and the voice. In chapter 2, I summarize some of the most widely studied differences between men's and women's voices, as well as the proposed origins of gender differentiation in the voice. I show that acoustically oriented research in this area tends to emphasize biological differences between female and male bodies as the direct source of gender differences in the voice. However, I argue that the literature as a whole provides evidence of great variability in terms of which characteristics index gender as well as the precise patterns that distinguish women and men. Often, social accounts do a better job of accounting for the entirety of the data than the proposed biology-driven explanations. Throughout chapter 2, I show that three key sociocultural factors consistently undermine any universalizing biology-driven theory of gendered vocal traits: the fact that many of these gender differences are learned during childhood language socialization; that there is considerable cross-cultural and cross-linguistic variety in the particular constellations of features that distinguish men's and women's voices; and that people within a given culture will adhere to normative speaking styles for their assigned genders to varying degrees. I also summarize previous research on transgender voices in order to further lay the groundwork for my own analyses. This literature centers around three primary themes: attempts at identifying the phonetic cues

that influence the perception of a voice as female or male; determining whether and the extent to which these cues can be modified; and locating the source of these gender differences in the voice. Together, the research described in this chapter provides the foundation on which my acoustic analysis (chapter 5) builds.

Chapter 3 discusses the ethnographic grounding of the dissertation and situates my work in the growing trend of combining ethnography and sociophonetic analysis (Hay & Drager 2007). I describe my own fieldwork, the participant-observation in which I engaged, and the contexts of the recordings I analyze. My dataset includes both read speech, as is often used in phonetic studies of gender, as well as recordings of interviews and more ordinary activities that are part of my participants' everyday lives. While chapters 4 and 6 draw on discourse data, the scope of my acoustic analysis is limited to read speech. However, I treat read speech not as a representation of how my participants speak in other contexts, but as a kind of performance that gives them an opportunity to enact a voice that fits – to whatever extent possible – what they regard as a desirable image of masculinity. Rather than shying away from read speech, I embrace it precisely because of its status as a genre of self-conscious language use that tends to reflect speakers' "best linguistic behavior" rather than their vernacular tendencies (Labov 1972). Given the goals of this study, learning about transmasculine people's ideas about what constitutes "best linguistic behavior" itself offers useful insights on their relationships with masculinity. Because I am interested in the ways social and linguistic context shape my participants' changing voices, chapter 3 closes with a discussion of my own role as a researcher and the influence that my social and linguistic positionalities may have had on my speakers and their voices.

The fourth chapter of this dissertation is concerned with language ideologies about trans people's voices. Here I draw on the work of linguistic anthropologists such as Silverstein (1979) and Irvine and Gal (2000) in order to explore the beliefs about the gendered voice from two sources: first, research by speech-language pathologists on transgender voices and second, the metalinguistic commentary of participants in my fieldwork. I identify several major trends in the language ideologies appearing in more than 15 articles from this body of work (which are also reviewed in chapter 2). Overall, authors tend to

assume that trans speakers desire voices that sound like straight, gender normative cis women or men who also embody various other forms of sociolinguistic normativity and privilege. Because the naturalization of gender differences in the voice appears in this literature just as it does in the phonetic research on non-trans men's and women's voices, speech therapy is framed as the ideal solution to the "problem" trans people face when choosing to stop using their "natural" voices and move toward some new, consciously learned (i.e. not natural) type of voice. When it comes to trans men, speech pathologists have pointed out that trans men's voices may continue to differ from the voices of cis men in various ways (e.g. Adler & van Borsel 2006), and thus argue that trans men may benefit from speech therapy. All of these discourses contrast drastically with the language ideologies expressed in metalinguistic commentary from the transmasculine people whose voices I analyze in this study. Though it is typical for transmasculine people to naturalize the "male voice" as the product of testosterone, they also allow for a relatively more flexible and less deterministic understanding of biological sex than do speech pathologists. Furthermore, speakers' emphasis on the pitch changes brought about by testosterone coalesces with a dedication to the notion of authenticity that results in a lack of interest in working to self-consciously masculinize their voices once testosterone does its work. In chapter 6, I refer back to these ideologies as an important component of my analysis of my speakers' changing voices.

My acoustic analysis is the focus of chapter 5, in which I present both methods and findings for the three sets of analyses I performed. First, I describe changes that take place in my transmasculine speakers' fundamental frequency, which shifted downward for all of the participants in this study during their first year or so of testosterone therapy. Second, I show that changes in formant frequencies followed a less consistent pattern. Although there was an overall downward association between formants and length of time on testosterone, this held only for the first formant (F1) and not the other two that were measured (F2 and F3). Furthermore, F3 showed an unexpected upward shift in formant frequencies. Gender differences in non-trans men's and women's formants, by contrast, are exist for all three. The acoustic profile of [s] was similarly inconsistent, in that some speakers showed a significant change in mean frequency, yet one individual showed a shift toward higher, rather than lower, frequencies in this

sound. This chapter also discusses inter-speaker variation for the three variables under investigation as well as variation in the amount of change speakers undergo.

Chapter 6 provides sociolinguistic analysis and discussion of the acoustic findings in chapter 5. In this space I describe local community members' conceptualizations of sex, gender, and sexuality, in greater depth. I show how trans people's ideas about these constructs complicate dominant notions that naturalize simplistic binary divisions for each. Rather than treating sex as a natural category that is fixed at birth, many trans people orient to biological sex as changeable, fuzzy, and socially constructed from several different physiological domains (genetics, anatomy, hormones, etc.). Gender, in turn, is divided into a series of elements that include gender assignment, gender role, gender identity, and gender presentation. All of these are further distinguished from sexuality, which is nevertheless tied up in the complex relationships these speakers have with gender and sex. I argue that all of these separate elements must be recognized individually and simultaneously considered together as part of a stylistic whole. The changes I observe suggest that testosterone does have a significant effect on the fundamental frequency of transmasculine people, but that these changes are inescapably tied up with social factors such as differences in identity, age, dialect, and numerous other planes of social difference. Furthermore, changes in pitch were accompanied by shifts in the articulation of [s] that do not appear to be directly influenced by testosterone. However, rather than attempting to pin down the exact source of any one phonetic variable, I argue that gendered phonetic styles must be viewed as cohesive constellations of features that are constructed to fit speakers' present circumstances, using the linguistic resources available to them. Regardless of when or how a particular linguistic variant was acquired, the variation that exists among the transmasculine speakers can best be explained in reference to their current identities and modes of self-presentation. I characterize transmasculine voices as the product of phonetic bricolage (following Hebdige's 1979 stylistic bricolage and Eckert's 2000, 2004, 2008 focus on its linguistic manifestations), in which stylistic resources from disparate sources are brought together to form a cohesive whole that is a unique product of that specific mixture. When viewed in this holistic manner, transmasculine speakers' phonetic styles illustrate the ways that changes in one linguistic characteristic (e.g. vocal pitch) can vastly

recontextualize the social meanings ascribed to another feature (e.g. a relatively more masculine- or feminine-sounding [s]).

The concluding chapter summarizes the contributions of the dissertation, discusses some of the limitations of the study, and presents plans to extend this research in the future.

1.4 Conclusion

This dissertation, like the voices of my research participants, is a product of a kind of bricolage that is characteristic of the field of sociocultural linguistics. I bring together the analytic methods of sociophonetics, the thick description provided by ethnographic engagement, and the insights of social theorists from anthropology, sociology, and the interdisciplinary fields of gender, queer, and trans theory. My focus is on the acoustic characteristics of transmasculine voices, but I also make use of discursive data as a means of analyzing language ideologies and the linguistic construction of gendered identities.

It is my aim in this work to reconsider what it means for a voice to be “female” or “male,” through an investigation of three acoustic traits that can serve to index speaker gender. By focusing on the linguistic negotiation of identity in a socially marginalized and relatively invisible group, this project shows how the gendered characteristics of the voice can be mobilized to construct very different kinds of masculinities. Rather than representing a speaker’s status as biologically “male” or “female,” phonetic styles are constructed with a degree of social complexity that powerfully undermines deterministic accounts of the gendered voice. Transmasculine speakers give us the opportunity to tease apart the complex web that constitutes sex, gender, and sexuality, but the observations I make about the gender as a multi-faceted construct apply equally to the construction of normatively gendered voices. In the chapters that follow, I demonstrate how attuning to the micro-level linguistic variation occurring in a group of speakers with an unusual set of experiences can nevertheless reflect basic facts about the workings of sex, gender, and sexuality as wide-reaching macro-level sociocultural constructs.

CHAPTER 2

EXPLAINING GENDER DIFFERENCES IN THE VOICE: A REVIEW OF THE LITERATURE

2.1 Explaining gender differences in the voice

The study of differences between men's and women's voices has a long history in the fields of phonetics and sociolinguistics alike. This literature is driven largely by the observation of pitch differences, but numerous other indexes of gender have been revealed as well. Despite the assumed importance of physiological differences between men's and women's bodies, purely biological explanations for gender differences in the voice have long been discredited as unable to account for the full extent of gender differentiation (e.g. Sachs 1975; Simpson 2009 for a review). Yet there is less certainty about the precise role played by social and biological forces in shaping the gendered voice, and biology often prevails as the go-to explanation in research on the phonetics of gender. The goal of this chapter is to synthesize claims about gender differences in the voice and to critically interrogate assumptions concerning their distribution and source. This will provide a backdrop for later chapters, which focus on transmasculine speakers' relationship to the potentially gendered aspects of the voice. I begin with a discussion of the aspects of men's and women's voices that have been studied most frequently: mean fundamental frequency; pitch range, variability, and dynamism; formant frequencies; vowel space size; segment duration; stop consonants; sibilant consonants; and voice quality. For each variable, I present the overall trend in the literature along with a summary of the explanations offered for the observed gender differences by the authors of this work. I then discuss the plausibility of their arguments in light of the sociolinguistic variation found for each of these characteristics. Though biological distinctions between the sexes are the most typical explanations offered, the larger picture indicates that sociocultural forces

have a marker more important role in producing the gendered voice than is typically ascribed to them. I present three consistent themes in the evidence for this kind of social influence: findings that show children take on gender-specific articulatory patterns before biological differentiation in the vocal tract sets in; cross-cultural and cross-linguistic comparisons that find different constellations of features associated with the gendered voice across the world; and sociolinguistic studies that showcase some of the great variety of phonetic styles found among women and among men within a given cultural context. I end the chapter with a discussion of how trans speakers have helped to shed light on the phenomena surrounding gender differences in the voice, and how my study of trans men and other transmasculine people further contributes to this body of knowledge.

It should be addressed from the outset that the majority of literature on gender and the voice is based on passages, sentences, or words read by research participants in an experimental setting (except where noted to the contrary). It has been a foundational principle in sociocultural linguistics that analysts recognize the influence of speech context. On the basis of work like Labov (2006[1966]), we should remain aware that read speech is likely to be standardized and thus less reflective of everyday, vernacular speaking styles compared to other contexts like conversations or even interviews. Yet the sociolinguists that point to this cross-genre variation generally do research on regional dialect forms or other variables that can be scaled on a continuum from standard to non-standard (though not unproblematically so). Little is known about the way gender-based variables differ across those types of contexts, and it is unclear what effect context may have on them. If we accept Labov's contention that people are on their best linguistic behavior while reading aloud, we might find that people use more gender normative voices when engaged in that type of speech. On the other hand, not all speakers aim for gender normativity. And even those who do hold gender normative masculinity or femininity as a goal, speakers may have more immediate interactional goals, such as articulating clearly, that carry unintended gender implications. If we accept anatomy-centered theories of gender and the voice, there is no reason to expect the gendered voice to differ across contexts, which in all likelihood informs the methods of many studies discussed in this chapter. However, as I argue in greater depth in chapter 3, these experiments provide their own set of

insights, even if they do not directly reflect how gender is indexed in other contexts. For now, I turn to the acoustically-oriented research on the gendered voice.

2.1.1 *Pitch and fundamental frequency*

Vocal pitch is the most intuitively obvious difference between men's and women's speech, and may also be the single most important cue for speaker gender (Coleman 1971, 1976; Linke 1973; Murry & Singh 1980; Gelfer and Mikos 2005). Pitch is a perceptual phenomenon in that it reflects how high- or low-pitched a voice **sounds**. The acoustic correlate of pitch is fundamental frequency, which refers to the rate at which the vocal folds open and close during phonation. This rate of vibration depends in part on the mass of the folds, so that given the same amount of air pressure, larger vocal folds produce a slower vibration, which results in a lower fundamental frequency (or F0).

The difference between men's and women's fundamental frequency typically arises during puberty (Lee et al. 1999; Whiteside 2001). Both young men and young women undergo a lowering of F0 during this time, due to growth throughout the body as well as the greatly increased testosterone production that characterizes male puberty (see Evans et al. 2008 on the correlation between testosterone and F0; Hollien et al. 1994 for an account of voice changes during male adolescence). According to Titze (1989), adult men's vocal folds are on average 60% longer than women's and the laryngeal cartilage is about 20% larger. Though others have speculated that men's vocal folds are also thicker than women's, Titze points out that pubertal F0 change would be less dramatic if thickening takes place.⁷ Among speakers of American English, average speaking fundamental frequency is generally placed at around 100-120 Hz for men and 200-220 Hz for women (Snicdeor 1951; Fitch & Holbrook 1970; Linke 1973; Stoicheff 1981; Traunmüller & Eriksson 1995; Simpson 2009).

A popular biological explanation for the divergence of men's and women's fundamental frequency was proposed by Ohala (1983, 1984). His theory, referred to as the *frequency code*, is based in

⁷ Titze explains that F0 is sensitive not only by the mass of the vocal folds, but by the ratio of thickness to mass. If thickness increases proportionally to overall mass in the vocal folds, the ratio will change less dramatically than vocal folds that become longer but not thicker.

an evolutionary conceptualization of gender as a natural system of male dominance and female submission. His goal was to explain why sex differentiation in F0 exists, in terms of its evolutionary function. The foundation of the frequency code is Ohala's argument that many animal species make use of low pitched sounds (e.g. a growl) to signal aggression and therefore presumably strength and dominance, while high pitched sounds (e.g. a whine) are used indicate docility and therefore presumably weakness and submission. According to Ohala, this cross-species association between dominance and low pitch on the one hand and submission and high pitch on the other can be explained in terms of physical size: because larger animals may be in a dominant position in relation to smaller animals, and larger bodies are thought to produce lower frequencies than smaller ones (though see below for more on this point), Ohala argues that a natural association arises between low frequency vocalization, large body size, and intra-species dominance. The major problem with the frequency code is that Ohala projects the association between low frequencies, large bodies, and dominance onto men, while women are associated with high frequencies, small bodies, and submission or docility. That is, he treats women's use of a higher pitch than men as evidence of a socio-evolutionary association between sex, size, and physical dominance. The frequency code, I would argue, comes perilously close to naturalizing men's social dominance over women.

The alternative explanation, which Ohala does not explore, is that any relationship between dominance and pitch in the social world is mediated by sociocultural ideologies about gender. The frequency code is a universalizing theory, and as such it does not consider the cross-cultural differences in norms for men's and women's speech (discussed below). Though Ohala (1984) collects empirical evidence showing that listeners associate lower pitched voices with dominance, he does not consider that the association might be based in social norms rather than having a natural, universal source. Thanks to work done since Ohala first published on the frequency code, we now know that linguistic perception itself is influenced by ideological factors, including sociolinguistic gender norms. For instance, Strand (1999; also Johnson, Strand & D'Imperio 1999) shows that even the very same sound will be perceived differently based on a listener's ideas about the speaker's identity. Specifically, these authors show how

the English phonemes /s/ and /ʃ/ are distinguished differently depending on whether a listener expects to hear a male or female speaker, and further by the perception of that speaker as either normative (or stereotypical, in Strand et al.'s language) or non-normative when it comes to their expression of masculinity or femininity. Van Bezooijen (1996), Yuasa (2001), and others have demonstrated that implicit associations carried by different ways of using pitch interact with the perception of distinctly social traits such as competence, arrogance, prestige, rationality, and so forth, none of which can be separated from understandings of human dominance in contemporary Western cultural contexts.

Putting aside the ideologically-loaded frequency code, other authors have also suggested that body size is an important explanatory factor for fundamental frequency, though empirical evidence is lacking. Quite a few studies have found no consistent correlation between F0 and either height or weight, particularly when speakers of the same gender are compared (Lass & Brown 1978; Graddol & Swann 1983; Künzel 1989; van Dommelen 1993; Hollien, Green, & Massey 1994; González 2004). That is, taller men do not have reliably deeper voices than shorter men, and the same holds for women. The size differences that seem to occur, then, are apparently based in gender (which of course co-varies with height), rather than due to height itself.

As I have just suggested, there is strong evidence for the influence of social forces, even where biology is clearly also at play. Differences in the F0 of women and men has been shown to vary across time, across cultures and languages, and across social groups who speak different varieties of the “same” language. The estimates for American English-speaking men's and women's mean F0 just cited, for instance, are considerably lower than those found in studies on demographically similar speakers conducted during the 1950's and 1960's (e.g. Yuasa 2008). This has been interpreted as evidence of a generational shift in norms for gendered speaking styles (though it is conceivable that other factors are significant, including small sample sizes or differences in analytical methods). Yuasa (2008) compares the downward trend in the F0 of American English speakers across generations to the situation among Japanese speakers, who do not seem to be undergoing this type of shift. In her comparison, she also

highlights the culture-specific patterns in men's and women's use of vocal pitch across these groups.⁸ Speakers of Japanese, according to Yuasa and others (e.g. Loveday 1981) maintain greater distance between women's and men's habitual F0 range, with the women using a much higher F0 than American English-speaking women and men using a lower F0 than American English-speaking men. In fact, studies of cross-linguistic difference appeared early in the study of gender and the voice, as with Majewski et al.'s work from 1972 on differences between male speakers of Polish and American English. One important study on F0 in tonal languages by Rose (1991) found no difference in the mean F0 of male and female speakers of the Wù dialect of Chinese, though there were differences in range. The men's F0 was on average 170 Hz, covering a range of 119 Hz to 232 Hz, while the women's mean F0 was 187 Hz and had a far narrower range of 182 Hz to 192 Hz. Wù's status as a tonal language seems to be important for explaining the lack of difference in mean F0 reported by Rose, though further investigation with larger speaker pools is needed (Rose analyzed only 7 speakers). Yuasa carries out a comparative analysis among speakers of American English and Japanese and finds that the American women had significantly lower fundamental frequencies than the Japanese women. She argues that this difference is due to American women shifting lower pitched voices over the last several decades, while Japanese women have not. The reason for this, Yuasa claims, is that Japanese prize femininity more than Americans. Her argument rests on the assumption that American women are becoming "more masculine" by using a lower F0 than previous generations, whereas a more culturally relativistic explanation would recognize that norms for femininity have changed and that sociocultural norms differ across these (quite generalized) cultural groups.

A final piece of evidence against biologically-oriented explanation of gender and F0 comes from investigations of children's voices. Although a number of studies show no gender difference in F0 until puberty (Bennett 1983; Günzburger, Bresser & ter Keurs 1987; Busby & Plant 1995; Lee et al. 1999), others' results suggest that some pre-pubescent children learn to speak according to the norms for pitch

⁸ It is problematic that Yuasa conflates language and culture, and that she homogenizes both speakers of Japanese and speakers of American English, but the patterns she identifies are useful nonetheless.

use for their gender as early as age 7 (Hasek *et al.* 1980; Ingrisano *et al.* 1980; Ferrand & Bloom 1995). Ferrand and Bloom, for instance, used conversational speech from 80 children, including 10 boys and 10 girls from four age groups: ages 3-4, 5-6, 7-8, and 9-10. These authors found that the boys' age 7-10 had significantly lower fundamental frequencies than the younger boys, age 3-6. This downward shift did not take place for the girls, however, whose fundamental frequency was comparable across the entire age range of 3-10. Ferrand and Bloom argue that this difference is due to biological changes in the larynx that begin before puberty. However, they also observe differences in intonational patterns between the older groups of girls and boys that suggest this group of boys was engaged in changes in pitch usage that are learned rather than biologically determined. In light of the strong evidence in the sections to come for children's use of identifiably gendered phonetic styles prior to biological differentiation of the vocal tract, it is all the more likely that socially learned gender differences are key to understanding the patterns Ferrand and Blooms discovered as well.

2.1.2 *Pitch range, variability, and dynamism*

Going beyond differences in mean F₀, gender differences are thought to exist in the way men and women vary their pitch during speech. The notion that women make use of a wider pitch range than men is a widely-held language ideology that has been taken for granted by many linguists, though its empirical basis has been challenged by Henton (1989, 1995a). It's clear that most English speakers have an association between femininity and an expansive pitch range, along with the use of greater pitch variability (i.e. more frequent shifts in pitch) and dynamism (i.e. faster shifts in pitch, following Henton 1995a) (see Brend 1975; Lakoff 1975; McConnell-Ginet 1978). The empirical validity of this association is what remains uncertain. Though some studies have compared F₀ range in Hertz, Henton (1989, 1995a) points out that pitch is perceived on a logarithmic scale, meaning that a shift from, say, 100 Hz to 110 Hz sounds more dramatic than a shift from 200 Hz to 210 Hz. As a result, Henton argues, women may make greater shifts in F₀, as measured with Hertz, while maintaining a pitch range that is perceptually equivalent to men's. Pitch can be normalized, or converted into a different measurement system – such as

semitones – that takes into account the logarithmic nature of perception and allows us to compare different F0 ranges more appropriately considering the hearing mechanism. When this kind of transformation is applied to the various data sets Henton reviewed, she found no significant gender differences in semitone pitch range. Another review article by Traunmüller and Eriksson (1995) similarly finds no consistent difference in men's and women's F0 range when those numbers are expressed according to the semitone scale rather than Hertz. These authors also stress the influence of factors aside from gender, including a speaker's language, age, and emotional state, along with the discourse context and text type (e.g. reading passages versus conversation). F0 range increases with emotional expressiveness ([insert citation]), which itself is often associated with femininity (a similar point is made Haan & van Heuven 1999; Haan 2002). As Simpson (2009) notes, how this association plays out in women's day-to-day linguistic practices is an open question. We cannot learn much about how pitch is used during speakers' habitual forms of affective expression without examining a much wider range of speaking contexts.

Importantly, it may not be a speaker's F0 range, but rather the way that range is used, that indexes speaker gender. Range is useful for understanding how high or low a speaker shifts their F0 while speaking, but pitch dynamism is a measure of the speed at which these shifts are made. The ideology that portrays women's use of pitch as more "swoopy" than men's (see chapter 4) is what motivated Henton's (1989, 1995a) investigations of dynamism. Henton's (1995a) later results lead to the same conclusion as her prior (1989) analysis: that there is no significant difference between men's and women's pitch usage when the semitones scale is used – at least in laboratory speech. Henton also considers pitch variability, or the frequency of upward and/or downward shifts in F0, which similarly fails to correlate with gender. Other studies consider the presence of particular intonational contours such as the use of "uptalk" or high rising terminal (i.e. a rising pitch over the course of an intonational phrase where a descending pitch might be expected). Some authors have challenged the assertion that women are more likely to use high rising terminal (HRT) than men, while others argue that the association between HRT and female speakers does hold in some communities. For instance, Britain's (1992) investigation of this intonational

tune in interviews with speakers of New Zealand English found it to be more popular with women among the young white New Zealanders. On the other hand, young indigenous speakers of both genders made frequent use of HRT as well, suggesting no gender-based pattern within that community. Pellowe and Jones (1978) argue that for speakers of the Tyneside dialect in the UK, falling tones are more common among men and rising tones more common among women. Shokeir (2008) found more HRT in the speech of Canadian women than men. By contrast, Peppé, Maxim and Wells (2011) find no gender differences in the intonation of Londoners. Buescher's (2009) thesis is focused on variety of interactional functions played by HRT, suggesting that we cannot consider gender as an explanation without also exploring the rich interactional work that is accomplished by this type of intonational shift. It is of great importance that studies showing differential use of intonational patterns among women and men tend to use spontaneous speech production rather than read speech. Intonational gender differences are likely context-dependent.

Regardless of intonational patterns actually used by women and men in practice, there certainly seems to be an ideological link between masculinity and monotonous speech. Because ideology affects perception, this connection alone may explain the results of studies like Bennett and Weinberg (1979), who report that children with more monotone voices are more likely to be perceived as male regardless of their actual gender, or Wolfe et al. (1990), who find that trans women who use a greater number of intonational shifts are more likely to be perceived as female than those who use fewer.

2.1.3 Vowel formants

Pitch is a vocal characteristic that speakers are consciously aware of and able to discuss on a metalinguistic level. Vowel formants, by contrast, are not the part of most people's conscious understanding of speech. For linguists, however, formants go along with F0 as the most basic and reliable differences between the voices of women and men. Formants are the frequencies that resonate within the vocal tract of a speaker, beginning at the larynx and ending at the lips. The frequencies that resonate within this space depends on the size of the vocal tract – lower frequencies will resonate in a larger space,

while higher frequencies will resonate in a smaller space. In addition to vocal tract size, formants also differ according to the shape a speaker articulates during speech; for instance, the position the tongue takes for /u/ results in lower frequencies for F2 compared to the position of the tongue for /i/. The lip-rounding that occurs with /u/ also has the effect of lengthening the vocal tract. Formants can be observed in other sonorant sounds, but are most relevant in vowels because they serve to distinguish vowel classes from one another. Several studies have argued that listeners are able to identify gender on the basis of formant frequencies, even when F0 is not available as a gender cue (Coleman 1971, 1976; Lass et al. 1976; Ecklund & Traunmüller 1997).

Because formant frequencies differ according to vocal tract size, many have supposed that those with larger bodies will have larger vocal tracts and hence lower vowel formants. This explanation is similar to the discussion of F0 above, except that in this case we are investigating the relationship between body size and the size of the vocal tract, whereas earlier we were concerned with the relationship between body size and the size of the larynx. However, authors who have tested correlations between body size and formant frequencies have not found strong evidence for this biological explanation. Of course, body size does not correlate perfectly with sex, and there is a great deal of overlap between the sexes when it comes to body size – perhaps more than there is for the size of the larynx (Titze 1989). Furthermore, formants vary greatly according to a speaker's articulatory movements because changing the position of one's tongue, lips, and larynx can alter the shape of the vocal tract and thereby shift the resonating frequencies. As with pitch, biological factors may limit the frequencies a speaker is able to produce, but they leave a wide range in which an individual speaker may situate themselves. As I will discuss below, research done by phoneticians like Simpson (2001, 2002) have shown that men and women differ in articulatory strategies that take gender differences beyond biological tendencies.

The empirical evidence shows only a weak relationship between formants and body size (Greisbach 1999; González 2004, 2007; van Dommelen 1993). A correlation between formants and height does show up when men and women are pooled into the same speaker group. However, intra-gender comparisons show only minor and inconsistent correlations – that is, larger men do not necessarily

have lower frequency formants than smaller men, and the same holds for women.⁹ We may conclude from this that the difference between men's and women's formant frequencies does not derive directly from height, as it appears to when the two gender groups are considered together. Rather, it appears to be an artifact of gender, which itself correlates with body size. This is not to say that "biological sex" (a concept I complexify in chapter 6) plays no role, but rather that an individual's body size does not directly determine the length of the vocal tract. As I will discuss in later chapters, biology can be understood as a resource for social meaning making without assuming that it is the sole force responsible for gendered behavior.

Another method of comparing body size to formant frequencies in vowels has been proposed by Fitch (1997), whose socio-evolutionary theory of formants is similar to Ohala's frequency code. Fitch focuses not on the mean frequencies of formants, but on formant dispersion – i.e. the distance between the formants. Greater distance translates into greater dispersion. If a speaker's first formant (F1) is 400 Hz, for instance, we can begin to measure formant dispersion by calculating the difference between 400 Hz and the frequency of the second formant (F2). An F2 of 1500 Hz, say, indicates less formant dispersion than an F2 of 2000 Hz. Fitch's study deals with the vocalizations of rhesus macaques, with the implication that his findings may hold for humans as well. He finds that macaques with larger bodies produced less dispersed formants than those with smaller bodies. However, González (2004) argues that this pattern does **not** hold among humans: he found no relationship between formant dispersion and body size among Spanish speakers, though the women in his study did tend to produce speech with greater formant dispersion than men.¹⁰

⁹ Actually, González found a stronger correlation among women in his study of young Spanish speakers, but van Dommelen and Moxness (1995) found the opposite gender pattern among speakers of English. Similar inconsistencies exist in the relationship between body size and F0 (see Graddol and Swann 1983).

¹⁰ This is to be expected from speech with a higher F0, because each of the vocal harmonics, including formants, are multiples of the F0. This means that harmonics will be further apart from one another when F0 is higher. For example, a speaker with an F0 of 100 Hz will have harmonics at 100 Hz, 200 Hz, 300 Hz etc., but a speaker with an F0 of 200 Hz will have harmonics at 200 Hz, 400 Hz, and 600 Hz). Because formants are the harmonics that resonate within the vocal tract, we can hypothesize that the formants will be spaced further from one another as well.

One explanation for the lack of correlation between body size and formant frequencies is that the overall size of the body simply isn't a good measure of vocal tract size. Traunmüller (1984) and Simpson (2009) argue that the descent of the larynx during male puberty is what results in a longer vocal tract among men.¹¹

But no biological explanation has been offered that can account for the gender differences that exist in the formants of children, whose vocal tracts have not yet diverged in development (Eguchi & Hirsh 1969; Sachs et al. 1973; Bennett 1981; Busby & Plant 1995; Lee et al. 1999; Perry et al. 2001). Adult-like gender differences in formants do not seem to fully emerge until adolescence, but children clearly learn to use gender-“appropriate” formant frequencies as part of the language socialization process. The studies I have cited show that boys generally speak with significantly lower formant frequencies than girls beginning as early as age 4 (Perry et al. 2001). Formant differences may be unevenly distributed, as in Smyth and Rogers' (2002) reanalysis of the data used by Lee et al. (1999), which shows significant differences in boys' and girls' F2 across the board, but differences in F1 only appeared in non-front vowels. Busby and Plant (1995), on the other hand, found gender differences in F1 for low vowels, and in F2 for all vowels except /ʊ/ (the vowel class represented by the word FOOT). Sachs et al. (1973) find significant differences in the formants for /i/ and /u/, but only non-significant trends for other vowels. Importantly, Fitch and Giedd's (1999) MRI scans of prepubertal children's vocal tracts finds no significant differences in vocal tract length on the basis of gender. We can therefore conclude that boys' and girls' use of gender-“appropriate” formant patterns are learned and put into use at a point in development when biological explanations are untenable.

Cross-linguistic differences appear in formant frequency patterns as well. For instance, Bradlow (1995) compares the vowel qualities of English and Spanish and finds that the English speakers' vowels had consistently higher F2, which suggests that the English vowels are pronounced with a different articulatory “setting” that places the tongue further forward in the mouth. The data presented by Henton

¹¹ According to Simpson (2009), women's average vocal tract length is 14-14.5 cm, while men's is 17-18cm. Greisbach (1999) puts the averages at 15.9 for women and 17.5 for men, respectively.

(1995b) reviews differences in the typical range of formant frequencies for the vowel systems of 7 different language varieties (3 dialects of English, Dutch, French, and Swedish). The vowel plots Henton provides suggest varying degrees of similarity between male and female speakers across these varieties, though no statistical analysis is carried out to determine the significance of the differences.

Finally, vowel formants differ across social groups on an intra-gender basis. Clearly, regional dialects are a major source of variation in vowels, though analyses that consider the degree of gender difference in vowel formants are lacking. Sexual orientation has at times been linked to gendered formant patterns. Munson (2007) argues that mean F1 correlates with the perception of men from the northern Midwest as “gay-sounding” such that men with higher F1 are more likely to be perceived as gay by listeners giving judgments in an experimental context. The fact that this holds for F1, but not F2, suggests that overall vowel tract size cannot explain the trend. Munson argues instead that some gay men make use of a higher F1 as part of a socially learned gay-sounding phonetic style. However, it is worth noting that Munson’s observation is an exception within the literature, which tends to report no differences in overall mean F1 or F2 among gay- and straight-sounding men (see Zimman under review for discussion of inconsistencies in this literature). It seems likely that Munson’s methodological approach, which made use of isolated words rather than the passages and sentences used in other studies, had an influence on the type of speech speakers’ produced, the cues listeners used to make their judgments, or both. In either case, the context sensitivity of the relationship between vowel formant and perceived orientation further supports the social nature of these acoustic properties.

2.1.4 Vowel space size

Another aspect of vowels that merits discussion is the overall size of the vowel space. The vowel space is the part of the oral cavity in which vowels are articulated; speakers who produce larger vowel spaces have a greater distance between the “edges” of that articulatory area. That is, front vowels such as /i/ are articulated closer to the front of the mouth, with a back vowel like /u/ being articulated closer to the back of the mouth. Likewise, high vowels are particularly high and low vowels are particularly low. Speakers

who produce smaller vowel spaces articulate within a less expansive area, with all vowels closer to the center of the vowel space (see Figures 2.1 and 2.2). Another way of thinking about this is in terms of vowel dispersion, or the (mean) distance of individual vowel categories from center of the vowel space.

Several studies have examined the size of the vowel space produced by female and male speakers of various languages (Traunmüller 1984, 1988; Bradlow, Toretta & Pisoni 1995; Whiteside 1996; see Henton 1995b for a review). Consistently, these analyses have shown that women tend to produce a larger vowel space, with more peripherally dispersed vowels. As Bradlow, Torretta and Pisoni (1995) have demonstrated, greater vowel dispersion is a significant predictor of speaker clarity, which was more characteristic of the women speakers in their study than the men. Byrd (1992, 1994) similarly argues that male speakers of American English from one phonetic database engage in more phonetic reduction than women on a number of levels. For vowels, this is manifested by men's tendency to reduce vowels to schwa (so that, for instance, *the* might be more likely to be pronounced as [ðə] rather than [ði]) within the contexts captured by the dataset.

Figure 2.1: Vowel spaces for 45 American English-speaking men, from Neel (2008)ⁱ

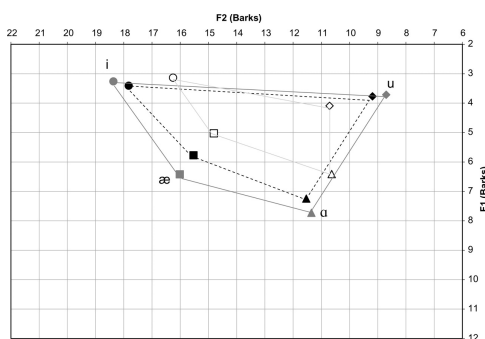
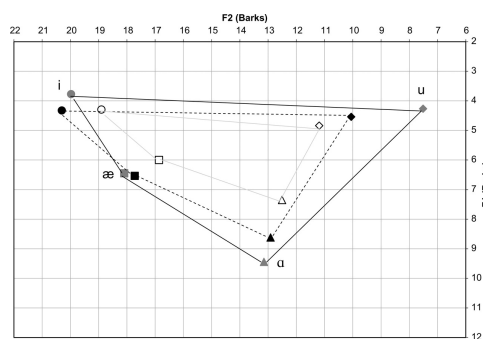


Figure 2.2: Vowel spaces for 48 American English-speaking women, from Neel (2008)ⁱ



ⁱ Solid black markers with a dotted line represent mean vowel space size. Open markers with a solid line represent the smallest vowel size for each gender group and grey markers with a solid line represent the largest vowel space for each gender group. These images have been reproduced with permission of the American Speech-Language-Hearing Association via Copyright Clearance Center.

Simpson (2001, 2002) focuses on a related issue in his analyses of the articulation of vowel sequences (specifically, the diphthong /ay/ in 2001 and cross-word boundary vowel sequences in 2002). Using articulatory data collected with movement-tracking pellets placed on speakers' tongues, Simpson shows that men traverse smaller articulatory distances at greater speeds and for shorter durations. The explanation he offers is based in part on the assumption that women have a smaller vocal tract than men not only in length but also in cross-sectional diameter. Using models of purportedly typical male and female vocal tracts based on Goldstein (1980), Simpson examines the articulatory distance that speakers would need to cover to produce the acoustic results from analysis of men and women who speak American English. On this basis, he suggests that women need to travel less distance to reach the same target, which leads him to propose that women may make comparable articulatory moves in less time than men, or they may take the same amount of time but travel at a slower rate. Fascinatingly, Simpson finds women traverse greater articulatory distances, at slower speeds, and for longer durations, which leads them to reach more peripheral targets. This suggests a level of redundancy that ensures women's vowels will achieve greater clarity than men's. This finding demonstrates that differences in articulatory habits are crucial even if anatomical differences also exist.

The relationship between biology and vowel space size presents a somewhat different picture than we've seen so far. While the larynx and vocal tract size are thought by some to be the direct cause of gender differences in F0 and vowel formants, vowel dispersion is a matter of articulatory behavior rather than the physical properties of the vocal apparatus. The question, then, has been what motivates these gendered patterns of articulation.

Diehl, Lindblom, Hoemeke, and Fahey (1996), have argued that women make use of a larger vowel space than men as a way of compensating for the relative difficulty of perceiving high-pitched voices (see also Ryalls & Lieberman 1982; Goldstein 1980). Rather than being due to gender per se, these authors argue that vowel space increases as a function of fundamental frequency. As F0 increases, the harmonics that make up the acoustic signal become more widely spaced, thus offering less robust phonetic information. This is because each harmonic is a multiple of F0. If F0 is 100 Hz, harmonics will

be present at 100 Hz, 200 Hz, 300 Hz, and so forth. If F0 is 200 Hz, harmonics will be present at 200 Hz, 400 Hz, 600 Hz, and so on. According to Diehl et al., the sparser harmonic sampling in the latter case makes vowel misidentification more likely. However, their findings are inconsistent and not particularly generalizable. While synthesized vowels created with a high F0 were more prone to misidentification by listeners in some cases, in other cases vowels were actually more accurately identified with a high F0. The use of synthesized speech is also quite limiting, because of the other factors that mitigate intelligibility. Most significantly, this study shows that vowels with a high F0 do not present a perceptual challenge if the F0 changes through the course of the vowel. Naturally occurring speech is characterized by frequent shifts in F0, in contrast with the completely monotone isolated vowels Diehl and his colleagues created for their listeners. so the speech we encounter on an everyday basis **does** typically show changes in F0 through its duration (this was certainly the case for the read speech I analyze in chapter 5). Furthermore, noise had to be added to the speech stimuli avoid ceiling effects in the perceptual task, indicating that listeners actually had very little difficulty perceiving either the high pitched or low pitched vowels without noise. This should lead us to question how much of an impact F0 truly has on intelligibility.

Simpson and Ericsson (2007) test the theory put forth by Diehl and his co-authors by comparing F0 and vowel space size among German speakers. While they found that higher F0 correlated with a larger vowel space among women – at least when outliers were removed from the dataset – there was no such correlation among the men. The authors suggest that compensation for high F0 may not be necessary within the F0 range exhibited by the males. However, it is equally possible that women with higher F0s also use a larger vowel space because both of these traits are potential markers of a “feminine” speaking style. It remains to be explained why vowel space size would not correlate with F0 among men, given that vowel space size does consistently relate to perception of sexuality, which is closely linked to the perception of masculinity among male speakers. However, thinking of gendered phonetic characteristics as comprising sociolinguistic styles, it makes sense that men and women might not show the same patterns when it comes to intra-gender variation in the voice.

A further weakness of Diehl's theory is that it cannot explain why women would end up speaking *more* clearly than men, rather than merely matching men's clarity, if women are truly predisposed to less intelligible speech. Clear vowels are only one facet of an overall clear speech style that is linked to women throughout the literature. Rather than being a sign of compensation, we can take this convergence of features as a potential stylistic principle underlying many phonetic gender differences. Notably, this is a sociolinguistic trend that goes against the expectations for biological influence, which predict women would have naturally less clear voices than men.

We find other signs of social influence that are by now familiar. First, Henton's (1995b) review found a tendency for women to use larger vowel spaces than men across 6 different language varieties (3 of which are dialects of English), but the size of this difference varies considerably. Second, male speakers of American English whose voices are perceived as gay-sounding have been shown consistently to produce larger vowel spaces than men who are perceived as straight-sounding (Smyth & Rogers 2002; Pierrehumbert et al. 2004; Munson et al. 2006; Zimman under review) – yet studies have consistently shown no significant difference in gay- and straight-sounding men's F0 (Lerman & Damsté 1969; Gaudio 1994; Linville 1998; Smyth & Rogers 2002; Munson 2007; Zimman 2010, under review). Neither gender nor F0, then, directly constrain vowel space size. Furthermore, given the highly contextual nature of clear speech, it is not clear how far these observed gender differences extend into day-to-day speaking situations (as noted by Byrd 1992, 1994).

2.1.5 *Duration*

Like vowel space size, the duration of speech sounds is another potential gender difference that is driven by articulatory patterns rather than direct anatomical restrictions. Numerous studies have shown that women tend to produce longer segments – particularly vowels – than men among speakers of American English (Hillenbrand et al. 1995), German (Simpson 1998), and Quebecois French (Martin 1995). Similarly, studies of Jamaican English and Creole (Wassink 1999), Creek (Johnson & Martin 2001), and Swedish (Ericsson & Ericsson 2001) have found women speakers to distinguish more dramatically

between long and short vowels than do the men (or, in the case of Ericsson & Ericsson 2001, between stressed versus unstressed vowels). In other cases the gender-based pattern is less consistent, as in Simpson & Ericsson's (2003) study of Swedish and American English in which there were no overall differences in men's and women's vowel duration. However, the female speakers in their study did produce longer segments in prosodically prominent contexts. Along with duration is the measure of speaking rate, which some authors (e.g. Byrd 1992, 1994) have found to differ between women and men, with women speaking slower than their male counterparts. By contrast, Ryalls and his co-authors (1997) found no such connection between speaking rate and gender among French speakers, nor did Simpson & Ericsson (2003; Simpson 2001, 2002) for speakers of English or Swedish.

Speaking rate, of course, varies considerably a bit across contexts. One might wonder whether the speaking context typical in this body of research, which generally involves reading individual words or sentences within a laboratory, is responsible for the gender difference. Perhaps, in some communities, women are more inclined than men to produce particularly clear speech while fulfilling the role of 'research subject.' On the other hand, Simpson's (1998) report on German women and men (cited in Simpson 2001) offers some insight on gender differences in duration across different speaking styles. He analyzed both read speech and data from a corpus of spontaneous speech, and found that both men and women produced longer vowel durations while reading than they did while speaking in more conversational interactions. However, in both the read and spontaneous speech, women produced longer vowels than the men by the same proportion – approximately 10%. Although the vowel durations themselves vary, the trend of German-speaking women producing relatively longer segments than men persists at least across these two contexts.

2.1.6 *Stop consonants: VOT and release*

Voice onset time (or VOT) is another phonetic trait that has been linked to gender, and its origins in either physiology or language socialization remain contested. Findings have been somewhat contradictory, but women have often been shown to produce stop consonants with longer VOT, indicating that there is a

longer gap between the point that the stop is released and the point that the vocal folds begin vibrating (Ryalls et al. 1997; Swartz 1992). Importantly, however, gender differences in VOT are not evenly distributed. Robb et al. (2005), find women speakers to have significantly longer VOT for the voiceless stops /p, t, k/, but find no such difference for the voiced stops /b, d, g/. Smith (1978) reaches a similar conclusion, and also finds that women tend to produce *shorter* VOT for the voiced stops /b, d, g/. These findings suggest, as Whiteside and Marshall (2001) have argued, that women tend to maintain a greater contrast between voiced and voiceless stops, since these sounds are distinguished by VOT (VOTs for voiceless stops are shorter than for voiced stops).

Gender differences in VOT can also differ depending on the precise consonant under investigation. Whiteside and Marshall (2001) find gender differences in VOT are greater for the alveolar stops /t, d/ than for the bilabial stops /p, b/. Morris, McCrea and Herring (2008) similarly report that gender differences in the VOT of /t/ are about twice the size of those for /p, k/. The voiceless alveolar stop has been studied by many sociolinguists, and is clearly a site of a great deal of socially meaningful variation. Eckert's (2008) explanation of the *indexical field*, which is a set of social meanings that can be attached to a linguistic variable, uses /t/ as a prime example for the density and diversity of meanings a single sound may hold. Rather than VOT, Eckert's interest is in the variation between released and unreleased /t/, generally in word-final position. The frequent use of an audibly released /t/ has been associated with gay men and professional competence (Podesva et al. 2002), nerds (Bucholtz 2001), and Orthodox Jews (Benor 2001). Byrd (1992, 1994) finds women to be more likely to release word-final stops. The option of producing a flap or glottal stop adds further layers of potential for the meanings attached to /t/.

As with vowel dispersion, anatomy-based accounts for gender differences in VOT dominate the literature (the release of /t/ and other stops has not been given this type of treatment). Swartz (1992) and Robb et al. (2005) argue that gender differences in this measure can be attributed to the need to time a series of actions that could be affected by the particulars of vocal anatomy: the onset of glottal vibration, changes in airflow, and supralaryngeal gestures (i.e. movement of the tongue, jaw, etc.). Sexual

differences in laryngeal size, pulmonary force, and so forth potentially create different environments in which speakers manage the timing of VOT. Koenig (2000) and Whiteside et al. (2004b) point to vocal fold flexibility as a potential influence on speakers' ability to control VOT, while Swartz suggests vocal tract length could also play a role. However, no specifics have been offered as to exactly how these physiological factors would influence (let alone determine) speakers' VOT. Any such explanation will also need to account for the fact that most speakers do have enough fine motor control to reliably distinguish between the VOT of voiced and voiceless sounds in their language and the fact that different languages have very different VOT distinctions, yet somehow humans as a species are able to learn whatever VOT patterns show up in their native language(s).

As Simpson (2009) also points out, biological explanations for gender differences in VOT have not been constructed in a way that explain the inconsistencies in the patterns described above. In particular, the fact that women are often shown to produce longer VOT for voiceless sounds while producing shorter VOT for voiced sounds remains unaccounted for. However, there is one cognitive explanation, put forth by Whiteside et al. (2004a) and Wadnerkar et al. (2006), claims that women's greater distinction between voiced and voiceless VOT can be explained hormonally. These authors find that women produce a greater distinction between voiced and voiceless VOTs during the portion of the menstrual cycle at which estrogen and progesterone are at their highest. Wadnerkar and her colleagues (2006) connect this finding to cognitive skills that are said to increase with higher estrogen levels, purportedly including fine motor movements, speech articulation, and verbal fluency (Wadnerkar et al. 2006:23). It was with this in mind that the authors had groups of English men and women repeat the same CV syllable (/pa/, /ba/, /ka/ and /ga/) ten times as quickly and accurately as possible in order to measure VOT. Whether this is at all representative of speakers' typical VOT patterns is unknown. As I suggested above, it may be that what varies is participants interest or desire to perform this task, rather than their raw ability to do so. This account puts forth a deterministic understanding of articulatory precision that is undermined by the immense variability in intraspeaker clarity, regardless of hormonal milieu. Even if hormones or other biological factors determine maximum articulatory precision, we need additional

layers of social, attitudinal and affective explanations in order to situate variation in measures like VOT within socially cohesive speaking styles.

Rather than being a troubling challenge, reported gender differences in VOT fit nicely into a sociophonetic conceptualization of gender and the voice. If women do tend to produce clearer speech than men, at least in some contexts, it makes good sense that they would produce a larger distinction between voiced and voiceless sounds, as this makes it makes the two sounds more distinct. Furthermore, we see a number of hallmarks of social influence. As I have mentioned, gender differences in VOT are greater in more socially salient sounds (i.e. /t/ over /p, k/).¹² Furthering trends established in earlier sections, children begin using VOT according to the patterns associated with their gender by age 11 despite not having reached physical maturity by that age (Whiteside & Marshall 2001). It is interesting to note, though that gender differences in VOT are apparently acquired later than other gendered phonetic traits (i.e. formant frequencies), which is a point that deserves future investigation. Offering a different perspective than what we have seen so far, Ryalls et al. (1997) find what they call “racial” differences in men’s and women’s VOT, suggesting that VOT may behave differently as a gender marker depending on ethnic community and/or language variety. The authors make a rather dangerous argument that physiological racial differences between “Caucasian” and “African American” bodies are responsible for their findings that Black speakers are more likely to pre-voice the voiced stop /b/. Considering the fact that race – a social construction that varies by culture – is a poor heuristic with which to understand biological diversity, it is far more likely that speakers of African-American English employ certain phonetic markers for gender differently than speakers of racially unmarked (i.e. “white”) varieties of English.¹³ Finally, gay-sounding men again provide evidence that, in fact, men can and do engage in the kinds of articulatory behaviors considered typical for women (and, we might hypothesize, vice versa). Smyth and Rogers (2002) report that Canadian English-speaking men whose voices are perceived by

¹² Interestingly, Whiteside et al. (2004a) reports a hormonal effect for the bilabial and velar stops /p, b, k, g/, but not for the alveolar stops /t, d/.

¹³ Ryalls et al. do not seem to distinguish between being ethnically African American and being a speaker of African American English, so the language varieties spoken by subjects are not reported.

listeners as gay-sounding had longer VOT in syllable-initial voiceless stops. Given the lack of evidence for biological differences in gay-sounding and straight-sounding men's vocal apparatuses – and indeed the evidence against it, considering the lack of difference in these groups' mean F0 – it seems safe to assume that cultural factors are at work.

Finally, I will note that because VOT is a measure of duration, one might wonder whether speaking rate might influence VOT (Robb et al. 2005). If women speak more slowly than men, perhaps this explains why women might have a longer VOT. However, at least two studies (Swartz 1992; Robb et al. 2005) find no significant correlation between speaking rate and VOT.

2.1.7 *Sibilant consonants*

Another area of gender differentiation can be found in the acoustics of sibilant consonants, particularly /s/. /s/ is produced through the creation of a constriction at or near the alveolar ridge, which results in a turbulent sound as air passes through this tight space. The bulk of the acoustic energy produced as part of the articulation of /s/ is in the high frequency range, compared to other fricatives, above 4,000 Hz (Shadle 1985, 1990, 1991). Women are widely reported to produce this sound at a higher frequency than men (Schwartz 1968; Flipsen et al. 1999; Heffernan 2004; Stuart-Smith 2007; Fuchs & Toda 2010) – or, more precisely, with relatively greater acoustic energy (manifested as higher amplitude) in the high frequencies – but not without exception. The range of frequencies found in /s/, and their various amplitudes, can be measured in a number of ways. One of the most popular involves statistical analysis of the distribution of acoustic energy within the sound. Referred to as the analysis of statistical moments, these measurements represent the center of gravity, a weighted mean frequency (moment 1); standard deviation of the frequencies' distribution from the center (moment 2); skew, which represents whether there is more acoustic energy skewed toward the higher frequencies or the lower frequencies (moment 3); and kurtosis, or the difference in amplitude between the louder frequencies and the quieter ones (moment 4). Flipsen et al. (1999) report that young women and girls as young as 9 tend to have a higher center of gravity, higher standard deviation, and more negative skew (indicating more high-frequency energy) compared to boys of

the same age. Fuchs & Toda (2010) also find evidence for more negatively skewed acoustic energy among women speakers of both German and British English. Heffernan's (2004) analysis of sibilants in English and Japanese indicates that gender differences are somewhat greater in Canadian English speakers' center of gravity for /s/ than in that of Japanese speakers. A different approach to measuring /s/ is the identification of the highest amplitude frequency (the "peak" frequency) in /s/, which has also been found to be higher among English-speaking women (Schwartz 1968; Stuart-Smith 2007; Fuchs & Toda 2010), though not German speakers (Fuchs & Toda 2010).

In keeping with previous sections, the origins of gender differences in /s/ are not entirely agreed upon. Several phoneticians have suggested that differences in vocal tract length lead to gender-based patterns in the acoustics of /s/. However, gender differences in the vocal tract are thought to be mainly in the posterior region – particularly the pharynx – whereas the frequency profile of /s/ is determined primarily by the small area in front of the tongue (Shadle 1985, cited in 1991; Fuchs & Toda 2010). There has been speculation that the "front cavity" – i.e. the space between the teeth and the point where the tongue comes closest to the roof of the mouth – might differ anatomically by sex, or that other anatomical influences may be at work, such as the size and shape of the palate. Fuchs and Toda (2010) take up the question of whether anatomy can explain gender differences in the acoustics of /s/ by analyzing a combination of acoustic and physiological measures. Using small groups of speakers of German and British English with a range of ages and dialects, these authors measured men's and women's palates as well as using electropalatography to capture the movement of the tongue against the roof of the mouth during the production of /s/. The male Britons in this study had somewhat longer palates than the women, though not significantly so. There was no such difference for German speakers. Fuchs and Toda also found a negative correlation between palate length and how far from the teeth the constriction is made, though again only among the English speakers. Palate size did not predict any of the properties of /s/ in German, nor does it account for all of the variance between the British men's and women's realizations (i.e. even where biological differences are matched, there are still significant gender differences). By contrast, we know that even quite minor differences in articulation can have significant effects on the

acoustics of /s/ (Shadle 1990:193, cited in Stuart-Smith 2007). Fuchs and Toda found that the size of speakers' front cavity is the best predictor of gender-differentiated acoustic properties. Fuchs and Toda suggest an indirect route for gender to influence front cavity size: the front cavity size is associated with the size of the palate, and the size of the palate correlates (but not quite significantly) with gender. However, this holds only for speakers of British English. For German speakers, differences appear to be purely articulatory. This overall picture makes a weak case for a correlation between sexually dimorphic anatomy and /s/ production, but Fuchs and Toda nevertheless argue that biology and culture are both important factors.

Variability in the placement of the tongue during the production of /s/ provides by far the best explanation for the widespread documented differences in this sound not only across speaker gender, but also speaker age, class, sexuality, language, and dialect. To begin with the cross-linguistic variation, Heffernan (2004) suggests that sibilants provide a more robust gender marker for Canadian English speakers than for speakers of Japanese. Gordon, Barthmaier and Sands (2002) too found disparities in /s/ across seven unrelated languages, only one of which showed gender differences in /s/ (Chickasaw). We also find the expected gendered articulatory patterns for /s/ appearing during childhood (Flipsen et al. 1999). Yet there is considerable variation among men and among women in terms of how this sound is produced. Specifically, /s/ has proven to be one of the most consistent indices that have been linked to listener's perceptions of English-speaking men as gay- or straight-sounding. Gay-sounding men tend to have sibilants with more energy in the high frequencies, represented by a more negative skew relative to straight-sounding men (Munson et al. 2006; Munson 2007; Zimman 2010, under review). Finally, /s/ is notable for being the focus of one of the few sociophonetic studies on the intersection of gender and socioeconomic class. Stuart-Smith's (2007) investigation of Glasgow English shows that adults and middle-class children age 13-14 displayed gender differentiation in the acoustics of /s/, women having a higher center of gravity and peak frequency. Yet the pronunciation of /s/ by working-class 13-14 year old girls had the same acoustic qualities as the /s/ of adult male speakers in the study. Since working-class girls are more similar physically to their middle-class counterparts than they are to adult men of any class,

we can conclude that socially-driven articulatory differences are responsible for this interesting finding.

We are also reminded that “women” and “men” are far from homogenous groups, and that numerous intersecting identities produce different constellations of gender-linked linguistic features.

2.1.8 *Voice quality*

I close my discussion of sociophonetic studies on gender and the voice with a consideration of voice quality, which has received growing attention from sociolinguists in the past few years. Investigations of voice quality (or phonation) focus on the way in which the vocal folds move. As we know, the opening and closing of the vocal folds determines fundamental frequency. In fact, there are a number of modes in which this opening and closing can take place in addition to the “modal” voice quality that is unmarked in most varieties of English. We know little about the social distribution of phonation, compared to the phonetic traits discussed up to this point, but there are two other types of phonation that have received attention in ways that are of interest to us here: breathy voice, creaky voice, and falsetto.

According to Klatt and Klatt (1990), breathy voice is generated when the arytenoid cartilages in the rear of the larynx are kept apart during phonation, creating a sustained opening between the vocal folds while they vibrate (meaning that the vocal folds do not fully close). By maintaining this opening in the glottis, the airflow that passes between the vocal folds creates some additional high frequency turbulent sound. Overall, the trend in studies of breathy voice is to identify women as producing breathier speech than men. In their classic empirical study of phonation and gender, Henton and Bladon (1985) find breathier phonation among women than men for speakers of two British dialects: Received Pronunciation and a variety they refer to as Modified Northern (i.e. a Northern variety that has been modified due to time spent away from the North of England). Similar results are reported by Klatt and Klatt (1990) for American English speakers from various dialect areas. Heffernan (2004) compared the voice quality of speakers of Canadian English with speakers of Japanese and found that women in both groups had breathier voices than their male counterparts.

Henton and Bladon (1985) offer an explanation for breathy voice among women that combines physiological and social forces. Specifically, they speculate – on the basis of others’ claims that breathy voices sound “sexy” (e.g. Crystal 1975) – that breathiness is biologically linked to sexual arousal. They suggest that increased lubrication, which they say occurs throughout the body during arousal (though no supporting reference is given), would apply also to the larynx. More lubricated vocal folds, according to these authors, may make closure of the glottis more difficult. If sexual arousal does lead to breathier speech, they argue that women may make use of breathy voice (based on social motivations, rather than biological ones) as a means of constructing an identity as a desirable woman (see also Hall 1995). While this account is possible, it is supported only by speculation. Furthermore, they don’t explain why the sexual desirability indexed by breathiness would be something women want to project but that men don’t. Titze (1989) offers a more purely biological account of women’s use of breathy voice, in which the thinness of women’s vocal folds inhibits their ability to fully close the glottis. However, the data presented by Heffernan (2004) undermines such universalistic explanations for breathy voice among women. His analysis suggests that the Canadian English speaking women he recorded had breathier voice quality than women who were speakers of Japanese. More importantly, Heffernan finds a correlation between unrelated ‘feminine’ speech traits: speakers with higher frequency /s/ also had breathier phonation (measured by the harmonics-to-noise ratio in the acoustic signal). Because there is no direct connection between the mechanisms involved in the production of /s/ (i.e. tongue placement) and the mechanisms of phonation (i.e. vocal fold movement), Heffernan argues that this correlation – which was only found among women – can best be explained in terms of speaking style. Styles are clusters of features held together by a web of social meaning, so speakers who make use of one ‘feminine’ phonetic trait are more likely to make use of other traits with similar associations.

Another mode of phonation that is of interest for our discussion of gender and the voice is creaky voice. Creaky phonation is created with the tight constriction of the arytenoid cartilage of the larynx, which brings the vocal folds close together such that only a small portion of the folds vibrate. The compression of the folds leaves them slack, and they vibrate at an irregular rate as low as 20-70 Hz

(Henton & Bladon 1988). Several authors have connected creaky voice to masculinity in non-American varieties of English, in some cases explaining this gender association by pointing to the low F0 that characterizes this mode of phonation (e.g. Pittam 1987; Yuasa 2010). Henton and Bladon (1988) extend their investigation of breathy voice quality in RP and Modified Northern with an analysis of creaky voice in the speech of women and men from these dialect areas. For both groups, men made use of significantly more creaky voice than women (see Stuart-Smith 1999 for similar findings in Glasgow). However, Henton and Bladon also find a dialect difference: the Modified Northern men made use of significantly more creaky phonation than did the RP men (in 61% and 23% of syllables analyzed, respectively). By contrast, there was no significant difference among the women across the two dialects. The authors explain the disparity among the men this by suggesting that the male RP speakers were “less masculine” than the men from northern England. They don’t consider that gender norms vary across communities such that creak needn’t necessarily be a marker of masculinity at all. But recent work on creak in American English suggests exactly this: that creak can also be associated with women more strongly than men.

Yuasa (2010) presents an analysis of creaky voice in conversational speech among same-gender dyads who were speakers of either American English or Japanese. She finds that American women make use of significantly more creak than either the American men or the Japanese women (Japanese men were not included in the analysis), and also points to particular contexts in which creak is likely to appear. Perceptual analysis further suggested that American listeners associate creak with young, upwardly mobile, urban-oriented women, at least in some stylistic contexts. Oddly, Yuasa too treats masculinity as the core meaning of creak based on the findings cited in the previous paragraph. Rather than treating her findings as evidence that creak can be associated with femininity in some communities, she argues that young American women use creak as a “strategy [...] to project a male-like authoritative image” (2010:318). This is an implausible argument that seems to rest on the assumption that sounding authoritative requires a speaker to sound masculine. If American English-speaking women are truly undergoing “unconscious efforts to adopt typically male characteristics” (Yuasa 2010:319) – a claim

Yuasa puts forth without supporting sociocultural evidence – why does gender differentiation persist so consistently at the phonetic level, often going above and beyond biological differences, as we have seen throughout this chapter?

It seems especially unlikely that creak is simply a marker of masculinity for speakers of American English given that this voice quality has also recently been linked to gay masculinity. My own research on the perception of certain men's voices as "gay-sounding" indicated that the men who used creaky phonation across a larger portion of their speech are more likely to be perceived by listeners as gay. Podesva's (2007) analysis of one gay speaker's voice quality across contexts also makes a connection between creak and phonetic styles that index gay identity. The range of studies I have cited on creaky phonation, with their apparently contradictory results, highlight the fluidity of gender markers. We can see, from this example, that the same trait may index masculinity in one context and femininity in another.

Finally, falsetto is another voice quality that has been linked to gender, no doubt because of its iconic representation of high fundamental frequency speech. Falsetto is produced when the vocal folds are stretched tightly to create a very high frequency vibration. Podesva's (2007) research investigates falsetto as a stylistic resource for gay speakers as part of the construction of certain kinds of gendered personae. Previous research on the perception of certain kinds of voices as gay-sounding had consistently failed to find statistically significant correlations between men's perceived sexuality and pitch mean, range, or variability. However, Podesva points out that laboratory speech is not conducive to the production of the kind of pitch variability associated with gay men's speech. Based on analysis of one gay speaker across contexts, Podesva is able to demonstrate that falsetto, together with creaky voice quality, creates a much larger pitch range than would be found with modal voice quality alone. Much less is known about the gendered distribution of falsetto voice quality, in comparison to creak and breathy voice, but it remains an important gendered stylistic trait that the speakers I discuss in later chapters draw on as well (see chapter 4).

2.1.9 Overall trends: Clarity & standardness

As the reader has no doubt noticed, speech clarity is a major theme running throughout the literature on gender and the voice. I discussed earlier that several linguists have argued women must compensate for the loss of intelligibility that comes with high fundamental frequencies. In fact, studies of clear speech phenomena have found that women's voices tend to be more intelligible than men's (Bradlow, Toretta & Pisoni 1995). Byrd (1992, 1994) finds that phonetic reduction is a common trend across various domains of men's speech (also Heffernan 2010), which suggests that stylistic trends – rather than individual physiological details – are responsible for the convergence of gendered phonetic styles. The relationship between gender and speech clarity is a complex one that is beyond the scope of this study. For the purposes of this chapter, it suffices to point out that phonetic findings of women's clarity can be seen as aligning with sociolinguistic studies that argue women often make use of the more prestigious linguistic forms – except, of course, when they don't (Eckert 1989a; Labov 1990; Gordon 1997; Maclagan 1999; Heffernan 2007). It is important to keep in mind that findings about clarity are for the most part constrained to the realm of read speech produced in experimental conditions, and further work is needed to see whether gender differences in clarity are context-bound.

2.2 Insights from trans speakers on gender and the voice

Having outlined the general trends that are thought to distinguish men's and women's speech, I now turn to research on transgender voices. Speakers who cross the gender divide in this way can help us better understand the relationship between gender and the voice as it functions for all speakers, which is one of the goals of this dissertation. In this section I describe the insights that have already been offered by research on the voices of trans people – primarily trans women. This work has been carried out for the most part by speech pathologists, with an eye toward identifying the ways speech therapists can help trans people sound more like gender normative members of their self-identified gender (more on this in chapter 4). I discuss three specific ways that these studies can inform the way gender is studied phonetically: 1) the identification of boundaries between male and female voices, 2) the flexibility of gendered phonetic

traits, and 3) the origins of these characteristics. I close this chapter with a discussion of the speech of trans men, who have been studied far less often than trans women, in order to specify the conditions that make trans men particularly interesting for the present study of gender and the voice.

2.2.1 *Identifying the relevant phonetic cues*

In order to help trans people feminize or masculinize their voices, it has been important to determine which phonetic characteristics predict whether a speaker will be perceived as male or female. The variability in how trans women's voices are perceived makes them excellent candidates for the study of which characteristics make a voice male- or female-sounding. Several studies, including Spencer (1988), Wolfe et al. (1990), Gelfer and Schofield (2000), and Gelfer and Mikos (2005), have had listeners identify the gender and rate the degree of masculinity/femininity of small groups of trans women based on read speech, sometimes with non-trans female and/or male controls. These ratings are then compared to acoustic properties. Others (Andrews & Schmidt 1977; Günzburger 1989, 1993, 1995) have had trans women or male-to-female cross-dressers read the same text in both "male" and "female" styles, which were then compared.¹⁴ The focus of these studies was to determine to what extent F0 should be prioritized as a cue for gender that trans women may benefit from addressing in speech therapy and how high F0 needs to be for a voice to be consistently perceived as female.

In all of the studies cited in the previous paragraph, mean F0 was predictably found to correlate strongly with perceived gender. Wolfe et al. (1990) found that the trans women in their study who were perceived as women had an average F0 of 172 Hz, while those perceived as male had a significantly

¹⁴ It isn't clear what to make of studies that ask trans women use a "male" speaking style, and whether such a performance would be representative of the speaker's former speaking style, as Günzburger assumes. Nor do we know the subjective goals of the speakers. I described in chapter 1 how trans people are often the subject of scrutiny and critique by the professionals and academics with whom they interact. In some of these contexts, the trans person risks having their identity undermined and services denied if they make a wrong step. Given the pervasive level of scrutiny of trans people's gender presentations, it would be surprising if participants in these studies were reluctant to attempt to use the masculine voice they were capable of producing. Many trans people would be uncomfortable with a request of this type to reassume their former gender presentation in some way. Somewhat troublingly, Günzburger (1989) concedes that "some time and much effort was spent by the experimenter persuading the subject to read the same stimulus material in the former, male way" (p. 166).

lower mean F0 of 118 Hz. For the speakers in Gelfer and Schofield's (2000) study of Dutch speakers, the female-sounding group had a mean F0 of 187 Hz (matching the mean of the cis female controls exactly), while the male-sounding speakers had a mean F0 of 142 Hz. Günzburger (1993) reports a smaller F0 difference, also in Dutch, with female-sounding trans women speaking with a mean F0 of 156 Hz, while the male-sounding trans women spoke at an average of 132 Hz. By contrast, Andrews and Schmidt found no correlation between F0 and perception when they compared the masculinity/femininity ratings given to a group of male-to-female cross-dressers who read the same passage in a female guise and a male guise. Listeners gave higher femininity ratings to the female guises, but F0 was not a significant predictor of these ratings. Instead, female guises were described as more melodious, breathy, animated, and less strong than the male guises. However, it is not necessarily useful to treat the voices of male-to-female cross-dressers as comparable to the voices of trans women, despite sharing similar physiological characteristics, given that male-assigned people who describe themselves as cross-dressers generally self-identify as men despite presenting as women in some contexts, whereas trans women self-identify as women regardless of self-presentation.

One might expect that the correlation between F0 and gender perception is a gradual, linear one such that the higher the speaker's F0, the more likely they are to be consistently identified as women and vice versa. However, Spencer (1988) finds that speakers tend to be identified in a consistent way, such that over ~75% of the listeners in her study agreed on each speaker's gender. Even for those who are close to the boundary that separates male-sounding speakers from female-sounding speakers, the perception of gender tends to be categorical rather than linear.

Surprisingly, given the large differences in the mean F0s for different studies' samples of male- and female-sounding trans women, there is considerable consensus over the point that divides these two groups of speakers. Several studies have concluded that the cross-over point is approximately 150-165 Hz (Spencer 1988; Wolfe et al. 1990; Gelfer & Schofield 2000), with speakers sounding female when F0 is above this point and sounding male when it is below. However, there are exceptions. Günzburger (1989, 1993, 1995) reports that a few trans speakers were perceived as women despite having F0s as low as 119-

128 Hz. It isn't clear whether the same could apply for English-speaking women, but Spencer (1988) notes that the female-sounding trans women with the lowest F0s in her sample reported changing other aspects of their voices aside from pitch. Conversely, Gelfer & Schofield (2000) show that speakers can be perceived as male with an F0 as high as 181 Hz.

The fact that some speakers sound male despite having an F0 higher than the ostensible gender cut-off point, while others can sound female despite having a lower F0, supports the notion that F0 is not the only factor contributing to speaker perception. This point is mentioned in most of the publications on trans women's voices, and several researchers have incorporated analysis of other acoustic traits into their treatments of trans voices in order to test the claim. The most common of these is the use of different types of intonational contours and other measures of pitch movement. Wolfe et al. (1990) compared the use of upward, downward, and level intonations and shifts in small groups of trans women, cis women and cis men. She found that trans women perceived as female had a higher percentage of fluctuations in pitch, while those perceived as male had less variable pitch. This factor was no longer significant when both mean F0 and intonation were included in a multiple regression model, but it remains a possibility that intonation plays a factor in the perception of at least some speakers. Using a similar measure of pitch variation, Günzburger (1993) finds that two speakers use a significantly larger F0 range when speaking in their male guise.

In other studies of trans voices, vowel formants have also been analyzed. Coleman (1971, 1976, 1983) and Gelfer and Mikos (2005) have argued that F0 is more important than vowel formant frequencies, because given a gender "mismatch" (i.e. male-typical formants with female-typical F0 or vice versa), speakers generally defer to F0 when making a judgment of speaker gender. However, it is also apparent that formants play *some* role because the combination of female-typical pitch and female-typical formants is more likely to be perceived as a female voice than a voice with female-typical pitch but male-typical formants. In order to create this type of mismatched voice, the authors of these studies had to rely on either synthetic speech or speech produced with a laryngeal vibrator (where a real speaker articulates the sounds but uses the sound-producing vibrator, placed at the larynx, as the F0 source). It is

difficult to say if these findings would apply to more naturalistic speech. Güzburger found that F3 was significantly higher in her Dutch-speaking trans women's female guises than their male guises for all but one speaker, but F1 and F2 were not. Interestingly, Gelfer and Mikos (2005) found that synthesized vowels made using the formants of trans and non-trans women were equally female-sounding when created with an F0 considered typical for women.

Two studies – Güzburger (1993) and Gelfer and Schofield (2000) – investigated a handful of other vocal characteristics. Güzburger finds that trans women spoke more slowly and at lower amplitude when reading in their “female” voice compared to their “male” voice. Gelfer and Schofield (2000), however, find significant differences only for mean F0 and upper limit of F0 across their female-sounding and male-sounding trans women. There were no significant correlations between perceived gender and types of intonational contours, formant frequencies, or lower limit of F0. However, there was a suggestive (i.e. not quite statistically significant) correlation between perceived gender and F0 range, expressed in semitones, as well as between perceived gender and F2 of /i/. Both were higher for the female-sounding speakers.

Together, this research suggests that fundamental frequency is the most salient signifier of speaker gender, but that other markers – including formant frequencies and potentially speaker's pitch usage – also play a role in this perceptual process.

2.2.2 *Changing the gendered voice*

The second contribution made by the study of trans voices is toward our understanding of the malleability of gendered phonetic features. In this case, it is generally case studies of trans women undergoing speech therapy that serve as examples of which phonetic traits can be changed most easily, to what extent, and with what kind of timing. The goal of researchers in this area is to draw attention to the ways speech therapists can help trans clients shift their voices toward feminine norms. Many researchers warn the reader that trans women may not be able to fully eliminate the “masculine” traits within the voice, but at the same time suggest that fairly extensive change is possible without any modification of physiological

structures (e.g. through laryngeal surgery). Because trans women's voices are not changed by hormones the way trans men's are, many more trans women seek out speech therapy, driving demand for applied knowledge of how trans women specifically might change their voices.

An early study in this mold is presented by Bralley et al. (1978), who describe a case study of a 49-year-old trans woman undergoing speech feminization therapy. This speaker was able to raise her mean F0 from around 145 Hz to approximately 165 Hz, putting her at the upper edge of the reported 150-165 Hz crossover range identified by other authors. Listeners rated the speaker as significantly more feminine after this rise in pitch, though her femininity ratings were still significantly lower than the cis women used as controls. The authors describe the trans woman's voice as androgynous, but clearly significant changes were made. Mount and Salmon (1988) report much more dramatic changes in the voices of a 63-year-old trans woman who participated in 11 months of speech therapy. This individual's mean F0 went from 110 Hz to 210 Hz during the first four months of therapy. This is a remarkable transformation, but the authors say it was not enough for her to be perceived as female consistently over the phone. Instead, it took approximately 6 additional months before the speaker's vowel formants had risen significantly as well, accompanied by shifts in voice quality and intonation that were not quantified by the authors but reportedly coincided with her movement into a female-sounding voice.

It would seem, from the analyses of these two speakers, that there is some degree of self-determination in what kinds of gendered styles speakers take on. There are ways in which the voice is constrained by the body, but if a 63-year-old speaker can jump from 110 Hz to 210 Hz in a matter of months, clearly biology is not the bulldozing force it is often taken to be. Coleman (1983) assumes that trans people would be unable to alter their vocal tract resonances because the size of the vocal tract is fixed; in fact, changes in habitual articulatory practices can have significant effects on speakers' acoustic outputs. As practical guides such as Gelfer (1999) and Davies and Goldberg (2006, 2011) suggest, formants can be altered by moving the carriage position of the tongue forward or back. Earlier in this chapter, I described evidence that children, too, manipulate their vocal tract length to noticeable acoustic effect.

It is remarkable that F0 and formant frequencies – considered to be the most clearly biologically-based of the gendered phonetic traits – are not strictly determined by sex. Without larger studies, however, we remain unsure as to the limits on gender-related vocal change, if they do in fact exist.

2.2.3 *Origins of the gendered voice*

Unlike the previous two sections, which have addressed speech scientists' explicit concerns in the literature on trans women's voices, here I address some on the unspoken implications of the findings from these studies. As the first section of this chapter demonstrates, biological explanations are de rigeur within the phonetic literature on gender. However, the changeability of the voice challenges the deterministic perspective implied in most anatomy-centered accounts of these phenomena. It seems likely that there are various ranges to which speakers are constrained on the basis of biology, and these may well vary based on sex-linked characteristics like hormone levels. On the other hand, trans speakers show that the strict constraints on characteristics like F0 may actually be quite broad. Nevertheless, in virtually all the studies of trans women I have cited there is a tendency to treat part of that range as more natural for male or female bodies. This is a point I pick up in chapter 4, but for now my point is that trans voices provide further evidence that the vocal qualities that sound masculine or feminine in one particular time, place, and context are not direct reflections of male or female physiology.

Physiology itself is more fluid than many discussion of biological sex differences suggest. Trans people can radically change their bodies with the help of medical technology – whether through hormones for trans men or laryngeal surgery for trans women – with important implications for the voice. But the sexual characteristics of the body change for non-trans people as well. Young adults are the usual focus of phonetic studies of gender, but some authors have also considered the way biology changes the voice through the lifespan. Puberty, of course, is a major set of changes that generally result in a dramatic shift in sexual characteristics (e.g. Hollien & Paul 1969; Hollien & Shipp 1972). But puberty is quite variable as a process and sexual development can be affected by a number of socio-environmental factors, among them nutritional access; environmental exposure to hormones or other compounds; cognitive,

developmental, or (for our purposes) hearing- or speech-based disabilities; and intersex conditions that materialize in puberty. Menopause presents another shift in hormonal physiology, which Stoicheff (1981) argues is the source of a drop in F0 among older women. Aging itself is an ongoing type of embodied transformation with implications for the voice – but these implications are not the same for women and men. Benjamin (1985) notes that the decrease in speaker precision that is attributed to the natural aging process when discovered among geriatric men is for some reason conspicuously missing from the data on older women.

Of course, all phases of the life are not equal when it comes to how much change takes place, and childhood is clearly a time of great learning as well as physical development. But the relationship between biology and behavior is not a one way direction; in fact, it is conceivable that biology actually develops partly in response to this learning process. Studies of sex and hormones have shown that hormone levels change in response to human behavior. Bernhardt et al. (1998) provide a well-known example of this process by showing that men's testosterone levels changed in response to the "vicarious" experience of having one's preferred sporting team win or lose (a win correlating with increased testosterone and the inverse for a loss). Testosterone is known to fluctuate over the course of the day and of course estrogen and progesterone too follow cyclical patterns, which are sensitive to contextual factors. Even the idea that bio-physical and social factors interact in the process of language acquisition is not a new one. Ochs and Schieffelin (1984) argue that how acquisition progresses, as a cognitive process that both depends on and shapes the physiology of the brain, is directly influenced by social context. The example they provide comes from Platt (1980), who found that Samoan children acquired verbs in an unexpected order due to their social role in the family and society. Normally, verbs like *come* and *go* are learned before more complex verbs like *give* and *take*, the latter requiring more syntactic arguments (e.g. giver, gift, and recipient). According to Platt, Samoan children learn the more complex verbs *give* and *take* before they learn *come* and *go* because they are encouraged them to participate in the acts of giving and asking for items, such as food. By contrast, Samoan children are not in a position to give others orders to move around physically, making verbs like *come* and *go* less likely to be used by these speakers.

Could a similarly non-deterministic story be told about the development of vocal tract anatomy? My aim here is certainly not to make a positive claim that the biology of the voice is determined by social experiences, but rather to identify the possibility that habitual patterns of language use during development – e.g. female and male children raising or lowering the larynx in order to create a shorter or longer vocal tract, respectively – may lead physical development to progress along different trajectories. Whatever influence biology has, studies of trans speakers make it clear that the potential range of our biology is much larger than the range most people actually use.

2.2.4 *Trans men and the voice*

Compared to the literature on trans women, there is very little published work on the voices of male or masculine-identified trans people. Many trans men make use of testosterone therapy, which is known to lower vocal pitch, and usually little more is said about linguistic issues for those transitioning from female to male. A widely-used guide to medical treatment and transition-focused care for trans men (Gorton, Both & Spade 2005) lists changes to the voice as one of the permanent effects to be expected for patients undergoing testosterone therapy. The authors note that a deeper voice is often the single most important motivator for beginning a testosterone regimen, which is a truism among the speakers in my own study as well. But considering its importance, the section of the document devoted to the voice is surprisingly short – only two paragraphs. Aside from estimating that changes in the voice become apparent within the first 6-8 weeks on testosterone, and a warning that throat soreness, squeaks and cracks may occur this period of change, little more is said about the process. For those who are concerned about speaking or singing as the voice changes, speech therapy is recommended.

Yet there is not much information available to speech therapists who might provide services for trans men. One study, described by van Borsel *et al.* (2000) and Adler and van Borsel (2006), tracks the changes in F0 for two Belgian trans men over a period of approximately one year. The first speaker, who was 22 years old when he started testosterone, had a notable drop in F0 around 4 months into testosterone therapy. He began with an F0 of 215-221 Hz based on a reading passage and 204-209 Hz for a sustained

vowel. After 13 months of oral testosterone,¹⁵ this speaker had an F0 of 155 Hz for the passage and 128 Hz for the isolated vowel production. The second speaker, who was 38 years old, began with an F0 of 160 Hz for the passage and 181 Hz for the vowel, which dropped to 132 Hz for the passage and 152 Hz for the vowel. Unfortunately, the native languages of these speakers are not reported (presumably it is either French or Flemish, though the passage used for data collection is given in English). This study is useful as acoustic evidence that vocal changes occur among trans men on testosterone, but its precise findings have little generalizability.

A larger study that is similar to this one in its analytic scope was conducted by Papp (2011), whose dissertation also tracks changes in F0 and vowel formants among seven trans men during the first year of testosterone.¹⁶ When it comes to pitch, she found that all the men in her study reached a pitch floor of 80-100 Hz, though their actual mean pitch when reading the Rainbow Passage was for most speakers between 101 and 137 Hz as of one year of a testosterone regimen (with the exception of one speaker, with a rather different transitional trajectory, whose mean stayed higher at 173 Hz). Starting points were in the range of 165 to 202 Hz. Trans men, then, are not necessarily speaking at the lowest pitch they can produce – a finding that aligns with some of the trends I identify in later chapters of this dissertation. Papp also investigated pitch range and, contrary to the claims of van Borsel and his co-authors, shows that some speakers have a temporary reduction of pitch range but that ultimately most ended up with a larger range (expressed in semitones) than they started with. Papp's dissertation is also among the only studies (along with Zimman 2010, under review) to measure trans men's formant frequencies. Strikingly, she reports that her speakers also showed a lowering of F1 and F2 during the first year of testosterone, which she attributes to changes in musculo-skeletal structure of the mandible, which is thought to be sensitive to testosterone and could affect the size and shape of the vocal tract. While

¹⁵ Oral testosterone, which comes in a pill form, is not generally used in the United States. Injectable testosterone, which is the most common administration form in the US, is often said to produce more dramatic and/or rapid masculinization than the oral or topical forms.

¹⁶ Though there is substantial overlap in the content of Papp's dissertation and my own, there was also overlap in the research and writing phases of our projects. As a result, much of the analysis and writing that appears here was produced before I had the opportunity to read Papp's work.

empirical documentation of testosterone-spurred changes in trans men's facial musculature and skeleton is still in its early stages, enlargement of the mandible or the muscles that surround it is one way that the vocal tract itself may be enlarged with testosterone. Growth of the pharynx and descent of the larynx – which occurs during typical male puberty and presumably involves changes beyond those that occur in the mandible – is another possible physiological explanation. Papp is primarily interested in the effects of testosterone, but also mentions a few potential socio-behavioral explanations for changes in trans men's formants. The present study explores some of the social themes she briefly touches upon in much greater detail, as the goal of this project is to situate trans speakers' voices in the complex sociocultural contexts in which they exist.

There is also some impressionistic evidence surrounding trans men's vocal changes in domains other than pitch. McNamara (2007) considers changes in vocal amplitude and resonance that can occur with testosterone, though it is not always clear how her usage of these words lines up with linguistic definitions of the terms (at times it seems that she uses resonance to refer to volume or amplitude, and at other times to her distinction between “head voice” and “chest voice”). Regardless of this fact, she makes a number of useful observations about vocal traits that bring up useful and interesting questions about the vocal transition process. Drawing on observations of a series of workshops for trans men hoping to masculinize their voices, McNamara notes that participants often reported having trouble ordering drinks in a noisy atmosphere, and suggests that speakers may lose amplitude when they make a conscious effort to use a lower pitched voice. Though it isn't clear that her assumption about individuals *intending* to speak in a lower pitched voice is right (more on this point in chapters 4 and 6), amplitude may in any case decrease for some speakers as their voices deepen. My own hypothesis is that voice quality could be relevant here, based on my observation of some trans men who speak with habitually or even perpetually creaky phonation, and whose voices are relatively quiet as a result because creaky voice is characterized by low amplitude as well as very low F0. This hypothesis is outside the scope of the present investigation, however, and will be a focus of future work.

To touch on another issue that may be related to vowel formants, Constansis (2008) discusses a way of speaking that he calls “entrapped FTM voice”. This seems to refer to a distinct, trans-sounding quality or speaking style that community members orient to and has sometimes been called “tranny voice.”¹⁷ Such voices have been described in members’ metalinguistic commentary as sounding cartoonish or high pitched. Constansis speculates that this phenomenon occurs when vocal folds thicken but do not lengthen, though he offers no real evidence or argument to support this assertion. My own impression of speakers who may be considered to have this type of “entrapped” sound – which is also speculative – is that they sound like they may have a low F0 matched with relatively high vowel formants, giving them the sound of a young, small, or somewhat feminine speaker (an hypothesis that Papp has independently suggested). Given that those in transition generally pay little attention to vocal traits other than pitch, such as vowel formants, and that the gendered qualities of vowel formants are based in part by habitual articulatory patterns, it seems quite plausible that the distinct trans-sounding quality Constansis describes arises for speakers who have articulatory habits that are more in line with the expectations for women than men, despite having a low F0.

Constansis, by contrast, argues that this “entrapped voice” can be avoided by a slow transition onto hormones, beginning with a low dose. He also stresses the need for trans men on testosterone to be trained to use their voice properly. The same training is apparently not seen as necessary for non-trans men going through the voice changes of puberty, suggesting a degree of naturalness to non-trans men’s vocal behavior that must be achieved through explicit training for trans men. Based on his own experiences and his perceptual analysis of the singing ranges produced by 15 trans students (that is, he determined their range by ear), Constansis argues that the slow introduction of testosterone is a more effective means of preserving one’s singing (and perhaps speaking) voice during hormonal transition. He bases this argument on the greater singing range retained by half of his speakers, which he grouped as

¹⁷ In some communities there has been a push not to use this term because of the baggage attached to the word *tranny*, which is generally used pejoratively in reference to trans women. Though the word has been reclaimed by some trans people, others feel it is inappropriate for trans men to reclaim a word that has historically been used against trans women.

beginning hormones with a “gradual” onset, over those lumped together as having an “abrupt” onset. Unfortunately, he does not conduct any statistical analysis of his quantitative data, so it is unclear whether the difference between the groups is significant. He also suggests that age and length of time on testosterone when voice training commences can affect the extent to which a trans man’s voice changes.

Despite the relatively small amount of generalizable research conducted on the ways trans men’s voices do and do not change, a number of programs for voice training have been put forth. Adler and van Borsel (2006) use the limited data from van Borsel et al. (2000) to build guidelines to be followed by speech therapists with trans men as patients. They argue that, contrary to the common wisdom that prioritizes testosterone, trans men would benefit from the further masculinization offered by speech therapy. They recommend assessment by speech professionals for all trans men despite the fact that the majority of patients who van Borsel et al. (2000) surveyed reported being happy with their voices. Other professionals also recommend voice training services for trans men, such as Constansis (2008) and McNamara (2007). At times, the promotion of speech therapy seems to be based on the assumption that trans people are aiming to sound as much as possible like the heteronormative ideal for their self-identified gender – this is certainly the case with Adler and van Borsel (2006). Such an assumption is not borne out by the speakers in my own study, as I explore in chapter 4.

My own contribution to the study of trans voices is three-fold. First, I aim to broaden our understanding of how the voice changes for transmasculine speakers, who remain highly understudied in the fields in which this study is situated. By making numerous recordings of 15 speakers during their first year on testosterone, my data allow me to track the rate at which these individuals’ voices changed. Like other studies of trans men’s voices, I consider changes in F0 in read speech, which are expected to be consistent with previous findings. Additionally, I consider vowel formants and the acoustic properties of /s/. Each of these measures has a different relationship to biology. F0 is known to change in response to testosterone, while it is not clear whether formant frequencies would be affected by such a hormonal change. By contrast, there is evidence that /s/ has little (if anything) to do with biology, and should not be directly affected by testosterone.

The second contribution my dissertation makes to the study of gender and the voice is toward our knowledge base concerning how gender differentiated phonetic styles arise for individual speakers. For example, by measuring the changes that occur in vowel formants, we can test some of the predictions that would result from the various theories put forth to explain gender differences in formant frequencies. An account that emphasizes height would predict little to no change in vowel formants, as trans men rarely get taller from testosterone.¹⁸ On the other hand, the argument that the larynx descends as it enlarges, resulting in a longer vocal tract for men, suggests vowel formants should lower at the same time as F0 drops, and that this pattern would hold across speaking contexts. A socially-oriented account of vowel formants could predict several different results, some of which overlap with the predictions made by biological accounts, but others of which more specifically support a sociolinguistic explanation: e.g. if the formants decrease without the kinds of across-the-board patterns we find in formant-based differences between women and men.

Finally, by including socioculturally-oriented analysis of transmasculine voices, my study explores the nature of gender itself more deeply than previous studies. Ethnographic engagement with speakers allows me to consider a holistic picture of each speaker's relationship with masculinity and their voices. As chapter 6 demonstrates, the diversity we can find among transmasculine speakers demands a multi-faceted picture of gender and the numerous other social systems with which it intersects.

2.3 Conclusion

I have shown that phonetic studies of read speech have found a number of differences between male and female speakers of English and other languages. These gendered traits are not necessarily available for metalinguistic commentary, but may nevertheless contribute toward our perception of speakers as male or female and as masculine or feminine. The majority of studies in this area construct a physiological model of gender differences, often based on a rather tenuous knowledge base on anatomical sex differences in

¹⁸ However, some young transmasculine people who begin hormone therapy before puberty is complete do report gaining a bit of height.

the vocal tract and at other times relying solely on speculation. We have heard about larynx size, height, vocal tract length, palate size, and more. Yet time and again, universalistic accounts are foiled by three trends – cross-cultural differences, childhood acquisition, and intra-cultural differences in gender expression, sexuality, class, and ethnicity. In recounting the findings of others' research, I have argued that explanations for the existence and distribution of gendered phonetic characteristics are most effective when they emphasize the influence of social dynamics in addition to engaging carefully with any empirical evidence for anatomical factors. Much remains unknown about gender and the voice, and this chapter has highlighted the ways trans speakers can augment our knowledge of this relationship. The task of the remainder of this dissertation is to put these claims into action by considering the social and biological context of voice changes among trans men and others on the transmasculine spectrum in the early stages of hormone therapy.

Now that we have some background knowledge of how gender might be indexed phonetically, we can begin to explore the particular context in which my research is situated. In the next chapter, I discuss the trans speakers who are the focus of this study and the mixture of data collection methods I chose to pursue.

CHAPTER 3

SOCIOPHONETIC ETHNOGRAPHY WITH TRANSMASCULINE SPEAKERS: SITUATING THE PROJECT

3.1 Introduction

As I discussed in chapter 2, most studies on gender and the voice have taken more strictly experimental, quantitative approaches to the questions that are at the heart of this dissertation. In these cases, gender is usually treated as a binary matter, often seemingly determined by the experimenter's perception rather than speakers' self-identification.¹⁹ By contrast, this dissertation's contribution stems in part from its combination of ethnographic and sociophonetic methods. In this chapter, I present details about my methodological approach, including my approach to data collection, my framing of the different types of linguistic data I analyze, and the explanations I offer for the findings report in chapter 5. I contextualize this work as part of the growing role of ethnographic methods in the burgeoning field of sociophonetics (see Hay & Drager 2007)

One of the goals of this chapter is to contextualize the community in which I conducted my research. Any reference to the linguistic practices of a "community," however, demands thoughtful consideration of how, and by whom, that community is defined. My discussion of ethnography thus leads into a section on the possible approaches to defining the communities with which I worked. Informed by my speakers' own perspectives on "the transgender community," I account for this construct as simultaneously an imagined community (Anderson 1983; Valentine 2007) and a set of many overlapping communities of practice (Lave & Wenger 1991; Eckert & McConnell-Ginet 1992). I describe my interactions with members of these social networks, including my recruitment methods, the contexts in

¹⁹ Admittedly, it can be quite awkward to ask someone their gender when it seems unambiguous.

which I engaged in participant observation, and the audio recordings I made during those interactions. In addition to describing my practices as a researcher, I also draw on the sensitivity to context that ethnography demands in order to reframe the experimental genre of read speech, which also plays an important role in this dissertation. I devote the remainder of the chapter to situating my study in the context of the San Francisco Bay Area's transmasculine communities, the quite diverse realizations of transmasculine identity found among my participants, and the approaches they take toward modifying their bodies with testosterone. I also offer caveats on some of the ways in which my participants fail to represent the transmasculine community, particularly with respect to racial diversity.

The final level of contextualization I discuss in this chapter is specific to my relationships with my research participants. Here I discuss the way my status as a trans researcher influenced the intersubjective negotiation of identity produced jointly by my research participants and myself. Trans people have a long, complex, and highly fraught history with researchers, leaving many potential study participants cautious at best. I argue that my speakers' (and my own) ongoing overt orientation to my trans status is in part related to this skepticism. Not only did being trans afford me access to speakers who might not otherwise have participated in my project and spaces that would otherwise be off-limits, it is also important to consider the potential influence of my voice – both literally and metaphorically – as a representation of transmasculinity.

3.2 Combining ethnography and sociophonetics

Ethnography is often spoken about as a method that can be thought of as a means for social scientists to establish a deep, holistic understanding of the everyday social life. Participant-observation is typically a key tool for ethnographers, though other data collection techniques, such as interviews, may also be used. Analysis of “micro” level phenomena is often prioritized, but, as Geertz (1973) points out, these analyses can help us answer fundamental questions about the workings of culture at the “macro” level. Importantly, though, ethnography is more than a method; it is also a theoretical framework that carries with it a particular perspective on language (among other facets of human life). As Jan Blommaert and

Dong Jie discuss in their recent handbook, *Ethnographic Fieldwork* (2010), ethnography's historical roots in cultural anthropology is responsible for its practitioners' tendency to take a functional approach to language as a resource for human activity. Language is fundamentally social, from this point of view, and always exists in socially meaningful contexts. This perspective runs contrary to the Chomskyan idealization of linguistic competence – a conflict that was brought into the spotlight in large part by Dell Hymes (e.g. 1974). Hymes was a major proponent of ethnographic contextualization as a crucial part of the study of language and argued that linguistic competence could not be understood without reference to communicative competence, i.e. the knowledge a speaker needs in order to put language to work within the context of a particular community and its norms. For Hymes and the scholars who have continued his tradition, there is no clear line between the linguistic and the social.

One goal of linguistic ethnographers, then, is to discover how context produces the social and linguistic practices observed in interaction. This production is always in progress, and always open for renegotiation – never static. Particularly for ethnographers who take a poststructuralist or ethnomethodological approach, social reality does not pre-exist the people who live it out; it is rather brought into being at every moment as part of a jointly co-constructed effort. Language is one of the primary means through which this negotiation takes place, and thus a means of social action. That is to say, it is not only the case that context informs practice, but also that practice produces and constitutes sociolinguistic context (Hall 2000; also Fox 1987 for a grammatical perspective on this recursivity). From this vantage point, understanding the contexts in which speech is uttered is a crucial tool for understanding why something is said, and why it is said in the way it was. In order to gain such an understanding, the ethnographer usually aims to uncover the internal logic of a community. Instead of privileging the categories that the analyst expects to be relevant – gender, for instance, or age, or experience with education – ethnography is meant to uncover the ways members of a particular group organize themselves. However, as Clifford (1986) warns, the narrative the ethnographer weaves about a community under study will always be partial, always an invention that is the product of the unequal shared “authority to represent cultural realities” (1986:6).

Ethnography has played a major role in the development of sociocultural linguistics over the past few decades. The field of language and gender, in particular, has been transformed by the trend toward ethnographic study. In the early inception of the field, the study of language and gender was often driven by the question, “How do women speak differently from men?” The assumptions that people can be split into two gender categories, “women” and “men,” and that these groups differ from one another socially and linguistically were thereby built into the research questions themselves. Major shifts in the landscape of the study of gender and culture more generally brought about a surge in ethnographic studies of language use in the 1990s, such as Penelope Eckert’s study of class and the Northern Cities Vowel Shift in a suburban Detroit high school (1989b, 2000), Kira Hall’s analyses of Indian hijras’ use of Hindi and English in constructing themselves as neither male nor female (1996, 1997), Bucholtz’s work with white youth in California (1999a, b), and numerous others. These studies showed that gender takes on different meanings, and linguistic expressions, in different communities. In Eckert’s now classic study of the Northern Cities Vowel Shift in Belten High School, for instance, she found different systems for making sense of and enacting femininity and masculinity across the different groups within the school’s social system. Among the young women, the femininity enacted by the students classified as “Jocks” (i.e. school-aligned, middle-class oriented teenagers) was quite different from the enactment of gender among the young women in the “Burnout” category (i.e. students who were oriented favorably toward working-class life in Detroit and away from the authority of the school). This was evident across several semiotic planes, including dress and makeup, social networks, and social activities; it was also manifested linguistically, with female Burnouts generally having the strongest Northern Cities accents and female Jocks tending to have the most “standard” (i.e. non-Northern Cities) pronunciations. The new focus on emic cultural explanations that arose among sociocultural linguists in the 1990s was a powerful tool for understanding how gender is constructed as part of our daily social lives. In this way, the interdisciplinary study of language and gender was instrumental in bringing the fields of sociolinguistics and linguistic anthropology together in ways that had not happened before.

In contrast to the core principles of ethnography and similar frameworks for the study of sociocultural and/or linguistic practices, phoneticians tend to approach the phenomena they study from a more traditionally scientific, positivist perspective. That is, linguists in this area aim to produce the most accurate possible account for something that exists in the world and can be observed. Fidelity to the phenomenon under description is one of the primary benchmarks of success. Where ethnographers tend to focus the situated, irreproducible nature of social interactions, phoneticians put more emphasis on the scientific method, experimental replicability, and dispassionate empirical observation. For phoneticians and others with similar perspectives on scientific analysis, perfect objectivity may not be viewed as an attainable goal, but it should be a goal none the less. Different phoneticians should be able to reproduce one another's analyses and reach the same results. By contrast, if reality is contextual and produced through social interaction, as ethnographers often argue, the same moment can never truly be recreated, even by the same participants. On one hand, I value the tools of phonetics, which involves an acceptance of the acoustic principles that are implemented in the analysis of speech. At the same time, when it comes to *social* reality, and its intersections with acoustic phenomena, my view is persistently focused on the way gender is produced, and not simply reflected, through everyday social practice. "Cultures are not scientific 'objects' (assuming such things exist, even in the natural sciences). Culture, and our views of 'it,' are produced historically, and are actively contested. There is no whole picture that can be 'filled in,' since the perception and filling of a gap lead to the awareness of other gaps." (Clifford 1986:18) Perhaps it is due in part to this epistemological tension that sociophonetics, as a relatively new field that draws on the assumptions, methods, and theoretical concerns of both phonetics and sociolinguistics, is still not usually combined with ethnography. As Hay and Drager's (2007) review of sociophonetics argues, "Great progress has been made recently both on the 'socio' and the 'phonetic' side of sociophonetics, but there is a dearth of work that takes these recent breakthroughs and unites them within the scope of a single study" (p. 90). My dissertation adds to this modest – and rapidly growing – body of work (e.g. Eckert 2000, Podesva 2006, 2007, Mendoza-Denton 2008, Hall-Lew 2009, Drager 2009).

Another, related way that my ethnographic study of sociophonetic phenomena differs from many other studies of gender and the voice is in the scope of data I collected. More often than not, the study of the most phonetic indices of gender rely solely on read speech as a representation of how women and men talk. If one assumes that gender differences in the voice are biological and absolute, and therefore not significantly variable across contexts, it makes sense to use read speech in this way. Read speech allows the analyst to control for the content of speakers' talk and it is easy to record read speech in a laboratory setting or within a sound booth. As I argued at length in chapter 2, however, every aspect of the gendered voice appears to be influenced by factors like culture, context, and identity. If we accept this argument, it is dubious that a speaker's vocal performance while reading into a microphone is representative of her or his language in more ordinary interactional contexts. Of course, it is one of the foundational observations of sociolinguistics that people tend to speak quite differently in formal contexts, like reading, as compared to more casual, conversational genres (Labov 1972). Analysis of regional, ethnicity-, and class-linked speaking styles, which can often be placed along a continuum from "standard" to "vernacular," has often concluded that more careful, self-conscious speech tends to be more standard, while casual talk in which less attention is paid to speech will tend to evoke more vernacular forms. It is less clear how the prestige of using more standard language variants might translate into the use of gendered phonetic styles based on previous studies; this is an issue I return to in greater detail in chapter 6.

Though my research involves ample collection of interactional speech, which I analyze in chapters 4 and 6, my own analysis also makes use of read speech. However, I do not treat my findings in this arena as generalizable to other speaking contexts. Instead, I frame read speech as an opportunity for my participants to produce a kind of performance in the context of their social subjectivity as research participants. As speakers who are acutely attuned to the potential for masculinity and femininity to be conveyed through their own voices, participants' are reading into a microphone in order to be assessed by a linguist who is interested in how their voices might be masculinizing; gender is almost certainly part of the self-monitoring my participants engage in. In fact, in my discussions with speakers during their exit interviews, all but one of my participants openly reported that the gendered qualities of their voices were

part of their conscious thought process while making recordings of read speech. With this in mind, reading aloud can be understood as an opportunity for performing, or experimenting with, various types of gendered voices. In other words, instead of trying to use read speech to figure out how my participants talk when they aren't reading, my interest is in read speech as a genre in its own right that can potentially reveal speakers' desires and stances with respect to their own voices. As I show in chapter 6, participants' phonetic styles when reading aloud reflect the enactments of gender that participants agentively claim for themselves both during interviews and other interactions. Like many linguistic ethnographers, I also used my participant observations as an opportunity to record speakers across a number of different contexts, which varied depending on the participant (more on this below).

The primary benefit of incorporating ethnography and sociophonetics, at least for the purposes of this study, is the way it allows me to ground my observations of acoustic phenomena in the intersubjective contexts in which they occur – as artificial or asocial as those contexts may seem. My goal was to understand my speakers as gendered social subjects, embedded in local communities, in order to have a richer perspective on the meaning of transmasculine identity in their lives. I also aimed to avoid the assumption that my participants' membership in “the trans community” would mean that they would experience their identities in a similar way, that they would have the same goals for how they wish to be seen by others, or that they would have the same history with respect to their history with gender and sexuality. By learning about my speakers over the course of many months, I developed a much richer understanding of the ways they present themselves to the world and how they hope the world will respond. As I will discuss below, my speakers showed a spectacular range in the way they described and enacted their transmasculine identities that may not have been captured by a non-ethnographic study. Before moving on to a discussion of doing ethnography with transmasculine speakers in the San Francisco Bay Area in 2010-2011, and the lessons learned from my long-term participant-observation, I must address a basic question: what is the trans community, and how can it be described?

3.3 *The “trans community”*

A challenge facing any ethnographic or sociolinguistic inquiry is how the community of study should be defined. This question was brought into center stage by some of the seminal figures in sociocultural linguistics, including John Gumperz, William Labov, Dell Hymes, Leslie Milroy, Penny Eckert and Sally McConnell-Ginet. These authors have challenged the grouping of speakers on the basis of shared nation, tribe, language, island, or macro-sociological category like gender. As the theorization of communities in sociocultural linguistics has advanced, it has trended toward localized, contextualized analyses that consider everyday social practices and group members' self-definitions. The influence of ethnography is clear.

The now familiar term *speech community* owes its development and popularity to John Gumperz (2001[1968]). Gumperz's notion of the speech community was a challenge to the assumption that speakers of the "same language" are more or less linguistically homogenous. Speech communities, for Gumperz, are groups who share norms for language use; in Hymes' terminology, they share a common communicative competence. In words that foreshadow later developments of the community of practice, Gumperz defines this construction as "any human aggregate characterized by regular and frequent interaction by means of a shared body of verbal signs and set off from similar aggregates by significant differences in language use" (Gumperz 2001[1968]:44). Two principal ideas define Gumperz's speech community: first, it is defined linguistically – people who use language in similarly distinctive ways, or at least have similar ideas about how language is to be used, are part of the same speech community. Second, it is defined by the attitudes and subjectivities of speakers about the boundaries of their community. In a familiar example, Gumperz notes that two varieties that are extremely close structurally (e.g. Hindi and Urdu) may nevertheless represent different languages to their speakers, with different norms of usage, and thus can be considered different speech communities.

William Labov's (1972) approach to the speech community is similar to that of Gumperz. Like Gumperz, Labov maintains that it is not a common language, but a common agreement about how language should be used, that connects members of a speech community. The classic example offered in his work is the definition of New York City as a speech community. New Yorkers vary quite a bit

linguistically, but according to Labov they share a common attitude toward the local dialect. For example, some New Yorkers tend to maintain the post-vocalic /r/ in words like *water* more often than not, while others tend to elide it. Yet, Labov argues, whether an individual tends to preserve or omit post-vocalic [r], they share the belief that the presence of [r] in these contexts is a sign of more prestigious speech, while its absence is a source of stigmatization (in the context of New York English, that is; [r]-lessness takes on quite different meaning when produced by a Londoner, by contrast).

As part of a push for more detailed investigation of the role of the individual within a community, social network theory was brought into sociocultural linguistics in large part by Lesley Milroy (1978, 1980). Milroy's method involved charting individual speakers and their relationships to one another in order to understand the connections between members of a community, as well as the overall picture of the network (its size, density, and so forth). Social networks prove to be a powerful tool in Milroy's classic study of Belfast English, in which she argues that non-standard speech tends to show up most often in dense, tightly connected networks. Critically, the social network is not merely a tool for the important business of analyzing linguistic variation, but also an object of study in itself. Milroy argues that we can understand more about sociolinguistic variation if our analyses include speakers' connectedness to others, as well as the nature of those connections, instead of demographic characteristics alone. Despite the usefulness of social networks as a tool for understanding communities, this theoretical approach leaves some important questions unanswered. Though we may learn a great deal about the structure of a community through this lens, it tells us little about the qualitative character of the community. If we hope to figure out how communities work, how they are formed, how they differ from one another, what their goals are, what their relationship to dominant social processes and institutions are like, and so forth, an additional layer of theorization is necessary. It is not enough to understand the individuals who make up the community, we need to recognize that communities are salient forces in and of themselves, not just collections of nodes.

One of the most influential theoretical developments in the field of sociocultural linguistics in the last twenty years has been the introduction of the community of practice (Eckert & McConnell-Ginet

1992, 1999, 2007). The community of practice, introduced by social learning theorists Jean Lave and Etienne Wenger (1991), is a way of understanding group-level social relationships in terms of culturally meaningful activity. This type of community is not defined in terms of similarity in speech or language ideologies, but in terms of some shared practice in which members are mutually engaged: working for the same organization, engaging in political activism, having fun among of friends, practicing a religion, playing video games, claiming some identity, learning how to speak Russian, and on and on. As Bucholtz (1999b) points out, one of the strengths of the community of practice, over the speech community, is its emphasis on social relationships rather than similarity in linguistic styles or attitudes. Though members of a community often obviously do share some linguistic practices, people tend not to form communities with others simply because they talk alike.²⁰ There are myriad reasons for community formation that are not motivated primarily by linguistic similarity (indeed, Bucholtz notes that disjunctures can also motivate the organization of a community).

Eckert and McConnell-Ginet's most recent (2007) revisitation of the community of practice pushes sociocultural linguists to take their analyses beyond the description of individual communities of practice. They suggest two directions for this work to expand. First, they argue that studies should engage in cross-community comparisons in order to better understand the scope of particular linguistic phenomena, how they vary, and what links them together. Second, the authors point out that the community of practice was never intended to be a replacement for other approaches to study. The community of practice is a grounded, practice-based approach, but our theorizations should not end at the micro-analysis of social praxis. As with ethnography, observations of community members daily lives' should be brought into dialogue with social processes that have a much larger scope, e.g. gender. One means of doing this, Eckert and McConnell-Ginet argue, is to link communities of practice to imagined communities, suggesting "women" as one possible construction of this type. It is precisely this combination that captures "the transgender community" as it appears in my research.

²⁰ Milroy's theorization of social networks also emphasize social connections instead of linguistic similarities and differences.

The “imagined community” comes from Benedict Anderson’s (1983) treatise on nationalism, though he points out from the start that the notion applies equally across many different types of human communities. As Anderson describes it, imagined communities are made up of individuals who share a sense of communion even without having met. As a construct, the imagined community complements the community of practice, with the latter deriving from concrete daily life and the former representing an abstraction of our social relationships. The “transgender community,” as a grouping that supposedly includes all individuals who express a gender different from the one assigned to them at birth, is a clear example of an imagined community. Valentine (2007) examines this connection in depth through his “ethnography of a category,” which considers how certain people and practices came to be understood under the rubric of “transgender.” His interest is primarily in the emergence of the “umbrella label” definition of *transgender* (as discussed in the introduction to this dissertation), which includes people who may not use the word to describe themselves. This category, he argues, was established in large part through social service agencies aiming to serve those with non-normative instantiations of gender and/or sexuality. Yet *transgender* also retains a specific meaning, referring to the type of gender variance typical in white, middle-class, and otherwise privileged communities in the United States. Valentine argues compellingly that the umbrella sense of *transgender* erases the experiences of poor people, and people of color, who are subsumed by the identity even if they may not identify with it, while centering the relatively more privileged people who use *transgender* as a label for their gender identities. Furthermore, Valentine argues that the establishment of *transgender* as applying to all forms of gender variance is in large part a product of social service agencies, academic theorization, and activist organizations.

The imagining of *transgender* was something in large part imposed from above, in Valentine’s account, but my interest is primarily the way people who identify as *trans men* or *transmasculine* imagine their trans(gender) community. In my own study, my participants contributed to a shared image of this community in their interactions with me as well as each other. When I asked my participants who they think of as belonging to “the trans community,” – the short form *trans* being more popular than *transgender* among the people with whom I interacted – and what the phrase means to them. I got two

answers, often from the same individual. On one hand, most people referred first to the local communities they participate in: their networks of trans friends, their trans-centered support groups or social organizations, and the trans people they see at community events. On the other hand, virtually every trans person of whom I asked this question also described a sort of universal (imagined) trans community. In some ways, their descriptions of this community reflect the “umbrella definition” of *transgender* that Valentine problematizes. At the same time, my participants’ insist on the agentivity of an individual to self-select their status as trans or not – a trans person is a person who considers themselves trans. This kind of simplistically-stated individualistic approach to identity reflects precisely the type of neoliberal self-making that underlies the privilege that Valentine unpacks from *transgender*. Among my participants, *transmasculine* is the umbrella term of the moment, intended anyone assigned female at birth who does not identify as a woman – even if they don’t identify as a man. Though these inclusive definitions are the most frequently ones cited in metalinguistic commentary about *transgender/transmasculine*, in fact trans identity may also be policed in community settings. Several of my research participants, especially those who identify as genderqueer – i.e. neither strictly female nor strictly male – often felt marginalized for not being “trans enough” (a canonized phrase in the community). In one online community I observed as part of my interest in my participants’ internet-mediated lives, I witnessed a moment of ideological conflict in which a controversial figure who was perceived as a “troll” (i.e. someone who incites disruption for the sake of disruption in online communities) was criticized for identifying herself as a “trans woman” despite not meeting the community’s basic requirements for the term. The figure in question was assigned female at birth, and self-identifies as a woman. However, she is able to grow a mustache and on this basis claimed status as a trans woman – perhaps seriously, perhaps not. The dispute over the validity of her claim centered around the fact that trans women are, in the eyes of the community’s most vocal members, defined as people who were assigned to a male gender role at birth. Self-identification is therefore clearly not community members’ only criterion for labeling someone as trans.

Valentine (2007) briefly considers the community of practice model as a potential augmentation to the imagined transgender community he describes. However, in the context of a chapter on drag as it is enacted by three groups of ostensibly transgender people, he points out that trans people are not engaged in identical practices, and so cannot be said to be engaged in a common practice the way members of a community of practice are expected to be. This is only a problem, however, if you expect that “the” trans community should be a single community of practice. Yet this is contrary to the community of practice model. In fact the very utility of the model is in its ability to recognize that an identity like *woman* remains a social construct to which people orient despite women not forming a single community of practice. I argue that “the trans community,” as an imagined entity, is the collective project of a series of overlapping communities of practice, with different practices at their core – not all of which are trans-specific. The participants in my study were not members of any single network, though there was a great deal of overlap in the social circles they each participated in. Most of my participants living in or near San Francisco attended a transmasculine discussion group at a centrally located community center, whether occasionally or on a weekly basis. Many from this group also maintained friendships outside of the group settings, and by the end of my fieldwork I became a participant in the regular outings organized by some of these groups. Furthermore, my participants were connected through medical resources: most of them accessed testosterone through the same San Francisco medical clinic that specializes in trans-related care. Many of my younger participants, transitioning in their twenties, frequent the same bars and nightclubs. And through the same lines of informational flow that allowed me to recruit my participants, they also learned about other trans-centered events, whether these were film screenings, discussion groups, “play parties” (i.e. gatherings centered around sexual contact between attendees), fundraising events, musical performances, and opportunities for political action.

I began my recruiting efforts by hanging flyers calling for volunteers for a study on the voices of transmasculine people in community venues I had learned of during my long relationship with Bay Area trans communities. I also began attending meetings at local community groups where transmasculine people meet in order to solicit participants. Because I wanted to record people who were just starting their

hormone therapy, I found many participants by placing flyers at the health clinic specializing in trans care just mentioned. There are several local and national online communities where I posted calls for volunteers as well, though this approach was less fruitful. Word of mouth, too, attracted some participants. I initially advertised my study for people who identify as “FTM” or “trans men” and are in the early stages of hormone treatment. However, as I will discuss at great length below, many of the individuals who responded to my request do not identify with this terminology, and instead take a non-binary approach to gender expression or identity. Though I had trouble at first finding participants who were just about to start taking testosterone, community members responded with great enthusiasm for my project from the start. I had anticipated recording 6-8 people during their first year of hormone therapy, but ended up taking on 15 speakers with whom I made regular recordings. However, 5 of these participants moved away from the Bay Area at some point during the course of the project and were unable to complete a year’s worth of recordings. My longitudinal analysis, therefore, focuses on the 10 speakers with whom I was able to make 8 or more recordings over the course of 10 or more months. With those 10, I made recordings approximately once every 4-6 weeks. In these sessions, participants always read the same passage (Fairbanks 1960’s *Rainbow Passage*, see Appendix A), along with a different set of sentences at each meeting. In addition to read speech, I would also record some other speech activity at each session; often, this activity centered around a conversation between myself and the participant, usually at their homes. With some speakers, I recorded them at home with family members, roommates, or friends; I recorded others at work, when their employers were open to my presence; and recorded others still at organized social events. Though my access to these kinds of recordings was somewhat irregular, depending on the participant, all of my speakers were available for regular conversations with me on a one-on-one basis, if nothing else. Conversations with the researcher fall somewhat short of ideal interactional data, yet our conversations was invaluable to my understanding of my participants perspectives on gender, trans identity, and the voice. Our interactions often resembled Alim’s (2004) semi-structured conversations, in which I often introduced topics to guide conversation as needed, but otherwise let the interaction develop organically. In some cases I was more successful than others in

establishing comfortable, casual relationships with my participants. When I felt I was having trouble establishing these kinds of interactions with my participants, I loaned them my equipment so that they could record themselves during their regular daily activities. Often, my decision to record in the everyday situations meant a compromise in audio quality, so I attempted to get recordings across a wide range of contexts to the greatest extent possible.

In addition to the 15 transmasculine people I recorded on more than one occasion, I also interviewed another 10 transmasculine individuals who did not participate in the long-term portion of my project, mostly due to having been on testosterone for a year or more. I spoke to these volunteers about their voices, identities, and experiences as trans people, which allowed me to fill in my knowledge of how trans people who have been on testosterone for longer periods of time orient to their voices. I also participated in various community events that I could not necessarily be recorded. As I have mentioned, I regularly attended meetings of a weekly support/discussion group for transmasculine people, along with several of my participants. In addition to exposing me to a broader segment of the transmasculine community, these meetings provided me with another setting in which to observe and come to better understand my participants, though the confidentiality of the space prevents me from reporting directly on those meetings. In June, I participated in the annual Trans March, which is part of the LGBT Pride weekend, along with most of my study's participants. Finally, my understanding of the community was further enhanced by my ongoing participant-observation in several online communities for trans people over the course of my fieldwork.

3.4 Trans masculinities in the San Francisco Bay Area

3.4.1 San Francisco as a trans city

When people ask me about the site of my fieldwork, and I tell them that my research is situated in San Francisco, I am met with a certain amount of predictable approval. San Francisco is known to be a queer mecca, with fairly large populations of openly gay, lesbian, bisexual, queer, and trans individuals. The size of the trans community in the Bay Area makes it a useful place to examine the diversity in trans

populations and the schisms that sometimes divide trans communities. San Francisco provides access to such a diverse group of transmasculine individuals on testosterone in part because of the resources for trans health care that are available to locals. The Bay Area has several trans-oriented social centers, major advocacy groups like the Transgender Law Center, many trans-specific community events such as the annual Trans March, and, significantly, at least four sliding-scale clinics that offer specialized trans-related health care, including the administration of testosterone. Approximately 10 years ago, the city of San Francisco made its commitment to transition-related care evident by moving to include those services in the health insurance provided to city employees.²¹ Mere days before this dissertation was filed, the same benefits were extended to participants in the city's Healthy San Francisco program for otherwise uninsured city residents.

Clinics like the Lyon-Martin Health Center, which serves women and trans people throughout the Bay Area along with the clinics for trans people living in San Francisco, do not make use of the gate-keeping process I described in the introduction. Instead, these clinics operate under the informed consent model, along with many physicians in the area with private practices. Under this model, trans people are given equal access to services that are offered to non-trans people on demand (e.g. breast augmentation for women or surgical reduction for men with breast tissue, hormonal treatment for men with low testosterone or women who have low estrogen/progesterone or who wish to modify their hormones with birth control). Instead of having to obtain approval from a therapist, patients need only understand the associated risks and benefits, just as non-trans patients do when they decide to take similar treatments.²²

²¹ Typically, transition-related medical costs are excluded from insurance policy's scope of coverage. This is possible because of the removal of transsexualism from the Americans with Disabilities Act, maintaining the legality of denying care on this basis even as other conditions became protected (see Hong 2002).

²² I have often been asked about the negative effects of testosterone on trans men's health, a question that seems driven by the assumption that introducing testosterone into a "female" body is inherently more dangerous than introducing it into a "male" body. In reality, little work has been done on the long-term effects of synthetic testosterone, but what evidence is available (see Gorton, Butth & Spade 2005) indicates that the risks trans people on testosterone face are comparable to non-trans men who need to make use of exogenous testosterone. Like any medication, there are potential side effects, but the known adverse effects mainly mirror health trends between men and women (e.g. transmasculine who take

Without such a system, many participants in my study may have had to misrepresent their self-understood gender identities in order to get access to testosterone.

According to the traditional Standards of Care for trans people – which are still influential in many places – transition can begin once a diagnosis of Gender Identity Disorder is established. For trans people, *transition* is both a noun and an intransitive verb, referring to the process of changing one's physiological sexual characteristics and/or social gender role. Often, people will distinguish between a *social transition* and a *medical transition*, which do not necessarily go hand-in-hand. In contrast with the metonymic representation of this transition as “a sex change operation,” trans people understand the shift from male to female or female to male as a variable process with multiple steps, trajectories, and destinations. For those transitioning from female to male, a recommendation from a therapist would typically lead to the start of testosterone therapy, which was expected to be continued for life. Hormone therapy was then to be followed by a series of surgical procedures, including genital reconstruction. Today, many people make use of testosterone without surgery, or have chest surgery (though rarely genital surgery) without necessarily wanting to go on hormones. Testosterone is by far the most accessible, and popular, tool of physical masculinization. The effects of the hormone are similar to the kinds of masculinization non-trans men experience during puberty: increased body and facial hair; a greater capacity for building muscle mass and fat centered around the abdomen rather than hips, thighs or buttocks; subtle changes in facial structure, body smells, skin texture and so forth; and decreased vocal pitch (Gorton, Buth & Spade 2005). The first few years of testosterone treatment can produce quite dramatic effects, particularly for younger transitioners, and for most trans men it seems that the changes induced by testosterone are sufficient to produce an appearance that others interpret as male. Often, the first surgery pursued is male chest reconstruction, which involves removal of breast tissue combined with surgical techniques that masculinize the contours of the chest (e.g. in the most typical surgical option,

testosterone face a higher risk of heart disease, just as men have higher a higher risk of heart disease than women). But the central point here is that assumptions that testosterone therapy is *more* dangerous for people with bodies that are female-assigned rather than male-assigned is driven by the naturalization of assigned sex rather than empirical reality. I discuss a similar ideological point, with respect to the voice, in chapter 4.

nipples are repositioned, scars are placed along the bottom of the pectoral muscle, resulting in a different aesthetic result than most medically necessary mastectomies). Chest surgery, too, can have a significant effect on the perception of a trans person's, especially for those who have difficulty concealing their breasts. Genital surgery is less common among transmasculine people (see Zimman forthcoming for more detail on trans men's genitals), either because it is not desired or because it is out of reach financially. For some people, physical masculinization is motivated by the desire to be seen by others as members of their self-identified gender category. Others say it's the desire to feel comfortable in their bodies that motivates their medical transitions. Others still report feeling no desire to change their bodies. But not all transmasculine people want to change their bodies, and some transmasculine people are dissatisfied with the expectation that they should have male bodies in order to have their social masculinity recognized. In other cases, medical transition may not an option for a variety of medical, financial, geographical, or other reasons. The perception of medical risks is sometimes a deterrent, as well. Regardless of whether a medical transition is pursued, a social transition is generally key so that others in a transmasculine person's life are aware of and recognize their masculine identities. One of the major signs of such a transition is a switch away from female pronouns and toward male or, sometimes, gender neutral pronouns. A legal name (and sometimes sex) change may be part of the process as well.

Though the San Francisco Bay Area has a vibrant trans community, it is not exactly a trans utopia either. In many ways, access to the services I have described is tenuous. In January, 2011, the Lyon-Martin clinic's board voted to close its doors, which was announced with only a few weeks notice. Incredibly, local communities immediately rallied and managed to raise half a million dollars through dozens of grassroots fund raisers that succeeded in keeping the clinic open. In September of the same year, Lyon-Martin began taking patients again, but its initial plans to close left many of my participants wondering where they would get health care. On an individual level, transmasculine people in the community had many stories of verbal and physical violence, employment and housing discrimination, and difficulty accessing basic (i.e. not necessarily trans-related) health care, homeless shelters, and programs that help those dealing with domestic violence. Furthermore, the presence and acceptance of a

large GLBQ (gay, lesbian, bisexual, queer) community does little, according to my speakers, to protect them from transphobia. In fact, I heard quite a few trans men and other transmasculine individuals living around the Bay Area argue that gays and lesbians are at times *less* sensitive than straight women and men when it comes to things like willingness to use a trans person's preferred pronouns and names. Such an observation may be surprising to outsiders who think of gay and trans people as closely related, but in fact the very existence of the category *transgender* stems in part from the divisions between gay and trans communities that began in the 1960s, if not earlier. In many ways, political discourses in these communities emphasize differences rather than similarities. However, many transmasculine people maintain ties with queer communities (for some this means queer women's communities, for others, queer men's communities), even when conflicts over trans issues may arise. I refer the reader to Valentine's (2007) and Stryker (2008a) for extensive discussion of these divisions.

A final reason the site of my research in the San Francisco area is important is that the masculinity expressed by my speakers is situated in relation to the types of masculinity one finds in the city and its surrounds. Particularly in urban San Francisco, but also urban centers like Berkeley and Oakland, many masculinities co-exist and, at times, conflict. All communities have gender diversity, but it often seems that non-normative masculinity thrives in San Francisco in ways that are unparalleled in most parts of the United States. Hegemonic masculinity of course continues to hold sway, but there are many communities with competing ideas about what manhood means: various gay communities including bears, drag queens, "straight-acting" gay men, and queer-identified men who reject homonormative²³ gay communities; straight-identified metrosexuals, androgynous young hipsters, male feminists, and vegan hippies; men who orient to the forms of masculinity practiced in non-Western contexts and men of color

²³ *Homonormativity* (Duggan 2003) refers to the normalizing of certain types of homosexuality – namely the types expressed by white, middle-class, gender normative, gay men and lesbian women who enact good neoliberal citizenship – at the expense of other queer groups that hold less privilege when it comes to class, race, etc.

whose masculinity is marked in relation to Euro-centric norms.²⁴ Importantly, part of the landscape of masculinity is transmasculine people themselves are a far more prominent part of the public consciousness in the Bay Area than in many parts of the US. For many residents of the area, the image conjured by a label like *trans person* is no longer dominated exclusively by the archetypical trans woman. For some transmasculine people, this is a blessing, as it provides others a point of reference to understand what they mean when they describe themselves as trans men, FTM, or genderqueer. But other transmasculine individuals find this visibility to be a burden, as it is sometimes easier to “pass” as a (cis) man in places where transmasculine people are more or less unheard of, as well as places where norms for men’s and women’s gender presentation are less flexible (see chapter 4 for more on “passing”).

3.4.2 *The sample of speakers for this study*

The participants in this study, in many ways, represent a wide swath of local transmasculine people. The sample includes people with an array of masculinities and ways of understanding their transmasculine identities. They also highlight the various ways sexuality can be conceptualized among members of this community. This variability is the subject of chapter 6, in which I connect the details of my participants’ genders and sexualities to the gendered phonetic styles they employ. However, there are other ways in which the individuals I recorded for this project do not reflect the transmasculine community in the San Francisco Bay Area, the most significant of which is in their ethno-racial identities. All but one of my participants in the long-term portion of my study identified themselves as white. The exception is Carl, a young, both straight- and queer-identified trans man who described himself as a Filipino person of color from a middle-class Bay Area family with parents born in the Philippines. Carl was 22 at the start of his participation in my project, and graduated from one of the Bay Area’s universities during the course of my fieldwork. Carl and I spent some time talking about the ways his transition has been guided by his experience as a person of color, which was also a topic of discussion with several African-American trans

²⁴ As a point of reference, the 2010 United States Census reports that white San Franciscans who identified themselves as not Hispanic made up only 41.9% of the population, while 33.3% of the city’s residents are Asian and 15.1% are Latino (U.S. Census Bureau, 2010).

men I interviewed. Though I make reference to the intersection of race and class with gender and sexuality in chapter 6, one of the most significant shortcomings of this dissertation is the absence of trans speakers of color. What is truly needed is comprehensive study of trans people of color, which are among the next steps in the progression of my research beyond the dissertation.

Another drawback of the sample is its age distribution. Eleven out of my fifteen speakers were between the ages of 22 and 30 (detailed information on each speaker's demographic categories is provided in Table 6.1). Four speakers were older, at age 38, 40, 46, and 48. In some ways, this may reflect the fact that the local trans communities to which I had access were generally more heavily populated with people under the age of 30, particularly among those just starting their transition. However, it is far from unusual for transmasculine people to be in their 40s, 50s, or older when they begin a transition, and it would be useful to have a larger sample in order to investigate potential effect of age on the progression of voice change. Community members often hypothesize that transmasculine people who begin taking testosterone at a young age have more extensive masculinization (also see Gorton, Buth & Spade 2005), which is a point I discuss further in chapter 6.

In terms of regional dialect, most of the speakers in this study grew up in the Bay Area, including seven out of the ten speakers including in my longitudinal analysis. One of the other five speakers was from the Central Valley of California. The other came from a variety of locations: one each from Cincinnati, up-state New York, Chicago, eastern Massachusetts, and the suburbs of Pittsburgh and New York City. Finally, one speaker grew up in Spain and speaks a variety of UK English learned from his Cornwall-born mother. Pol is a 23 year old working-class student who identifies as queer and genderqueer trans boy. I address the relationship between his English accent and the gendering of his voice in chapters 5 and 6.

In contrast to race and age, my participants did represent a range of positionalities with respect to self-described socioeconomic class. Three participants described their family background as upper middle class or, in the case of James, "class-privileged." Only five said their families were middle-class, though in some ways this is the most slippery class label because of its association with American normalcy. The

remaining seven said they were from working class families or, in two cases, poor or welfare/working class. A few had been professionally successful to the degree that they have staked own their own upper-middle class status. An example of this upward-mobility comes from Ethan, a 48 year old straight trans man who grew up in a working class Pittsburgh suburb but now owns his home as well as some investment property and had a successful career working in for a pharmaceutical company prior to becoming disabled a few years before we met. Unfortunately, it was more common for my participants to have made a downward move in class status from middle- or upper middle-class to working-class or poor. Often, their economically precarious circumstances were clearly related to their trans identities (though several work in environments that were truly supportive of their transitions), and some were unable to draw on whatever financial resources their families of origin might provide for this reason. One of my participants who dropped out of the project after a few months in order to move to Portland, Jeff, and another trans man I interviewed on one occasion early in the project, Yoshi, were both homeless and having difficulty accessing homeless and domestic violence shelters because of their trans status. Jeff told me he didn't feel he belonged in women's shelters, but didn't feel safe in men's spaces either. Yoshi reported being repeatedly turned away from domestic violence shelters when he revealed that he self-identified as a trans man, even though he was outwardly presenting himself as a woman at the time. Joe had been out of prison for only a short time when I met with him, and was in recovery from drug addiction that, he says, developed in part as a way to cope with his feelings about his gender prior to coming out as trans. When we met, he was living in a sober living house for women, which kept me from recording or observing him in his usual daily environment. After a few months, Joe too moved to Portland to live with friends and start building a new life for himself. Those who did have steady jobs were occupied in a range of professions, from bus driver to film-maker to beauty store sales clerk.

The participants in my fieldwork are surely not representative of the trans community as a whole. Yet even in the small sample of individuals I worked with, there was a great deal of variety in the flavors of masculinities they enact. This diversity became clear over time, as I interacted with my speakers and was able to observe their identities taking shape of the course of many months. The ethnographic data that

makes this account possible will also allow for richer explanations for my acoustic findings, as we shall see in chapter 6.

3.5 The role of the researcher

Sociolinguists have long held an interest in the way people vary their speech depending in part on who their interlocutors are. Unsurprisingly, this kind of variation applies to interactions between researchers and study participants just as it does to any other set of conversationalists. Rickford and McNair-Knox's (1994) study of African American English, for instance, shows that differences in interviewer race and the degree of familiarity between the interviewer and interviewee can result in very different speaking styles, and hence very different language data. This goes beyond Labov's observer's paradox, which states that being observed and/or recorded by anyone will motivate a speaker to speak according to more standard language norms; what work like Rickford and McNair-Knox's suggests is that the observer's paradox can apparently be mitigated by certain combinations of interviewer and interviewee while other combinations will intensify the degree to which subjects adhere to standard language norms. Bell's (1984) notion of "audience design," which emphasizes the primacy of the speaker's orientation to others participating in the speech act, is one potential lens through which we might view this phenomenon. Accommodation theory is another potential perspective, which in this case might lead us to expect that research subjects will shift their language to accommodate specifically to the speech of the researcher (which often, but not always, means using a more standard variety). Interestingly, Trudgill (1986) describes his discovery that his own speech that shifted dramatically to accommodate different interviewees, when he had expected to find the reverse. Whatever theoretical framework we use, language use is clearly flexible in a way that responds to different audiences or interlocutors.

The history of recognizing the researcher's influence in sociolinguistics dovetails with the push in anthropology over the past few decades for a more "reflexive" approach to ethnography (see Wertheim 2009 on the importance of bringing these literatures together). Because ethnography is inherently partial and subjective, glossing over the subjectivity of the ethnographer may be seen as an attempt to sweep the

dust under the rug. Most of us would agree that there are some forms of “bias” that should be avoided (for instance, cherry-picking data in order to make a group look “better” or “worse” by some standard), but reflexive anthropology asks us to own up to our subjectivity and closely consider *how* it influences the fieldwork process. The growth of reflexive ethnography has happened alongside increasing numbers of “native” ethnographers working in communities to which they, in some sense or another, belong. The unsettling of the barrier between researcher and researched has produced new kinds of ethnographic knowledge, and at times allowed access to sites that might not be granted to “outsiders.” This is not to say that native ethnography provides more or better insight than studies performed by non-members. In fact, anthropologists who do research at “home” rarely “play the native card,” as Jacobs-Huey (2002) puts it, “via uncritical privileging of [their] insider status” (p. 799). But one of the values of native ethnography is the way it has highlighted and complicated the relationship between researcher and subject by interrogating the meaning of the category “native.” Often, “native” anthropologists have been partial or problematized members of their communities, as when American scholars of color have examined cultural contexts in their ethnic “homeland” or other sites of the diaspora of which they are a part (e.g. Kondo 1986, Abu-Lughod 1991, Limon 1991, Narayan 1993, Menoza-Denton 2008). Even where researchers are clearly members of their communities of research, there is often a great deal of negotiation to authenticate ethnographers as both researchers and legitimate in-group members. In some communities, being a member and being an academic are not understood to be compatible.

More important than any a priori measure of insider status, the key question is how research participants’ understand and orient to a researcher’s identities. If they consider the researcher to be an in-group member, and treat her or him as such, it is worth investigating how that attention manifests interactionally and linguistically. In the case of my own fieldwork, there is no doubt about the salience of the fact that I, like my research participants, am trans. My trans status proved to be influential in terms of recruitment, access to spaces for participant-observation, and the significance of my own voice within my interactions with community members. It is particularly relevant that many trans people are distrustful of researchers based on the perception that they have been denigrated or misrepresented in academic

literature. When these issues come up, the identity of the scholar is often a topic of open discussion. Two participants who did not deduce my trans status prior to meeting me, though this information was included in my recruitment materials, asked me whether I was trans during our first or second meeting (see also Vidal-Ortiz 2002 on the way the trans men he worked with referenced his own identity as a gay, non-man, as a point of comparison for their own masculinities).

But the clearest example of the trans community's orientation to my trans status as a researcher came from an email exchange I had with a local trans man who offered to circulate my call for participants in his social network. When I mentioned that I had been having trouble finding trans people who were in the desired stage of transition (i.e. just beginning testosterone therapy), his response was helpful and sympathetic. But the primary point of the email was to warn me that trans people are often wary of researchers, suggesting that perhaps I shouldn't get my hopes up too high. After I told him, in my reply, that I was sensitive to those concerns because I am also trans and have been disappointed by the uninformed and insensitive representations of trans people that appear in some academic work, his next email took on a decidedly more friendly tone. His focus changed to expressing hope that he could help me find some participants, as well as happiness at finding out that another trans person was doing research in and participating in his particular community. Wariness of researchers no longer seemed to be an issue. Several of the trans people who did end up participating in the project confirmed the importance of my trans identity by telling me outright that they would not have volunteered for the study were it conducted by a non-trans person; others indicated that they would still have wanted to participate, but that they would have been more cautious and would want to make certain that the researcher was sensitive to and informed about the community's concerns. Only two said they were certain they would participate in a study like this, regardless of who conducted it, because they consider the topic important. On the other hand, Devin pointed out that he would be careful about the purpose of the research regardless of whether the researcher was trans or not. Being trans isn't enough on its own to make one trustworthy.

In addition to facilitating my entrée into the field, my status as a trans academic also influenced the types of interactions I had with my participants. As part of the process of building relationships with

the community members I was working with, and creating a more casual, conversational exchange, I often shared stories or thoughts from my own life and transition experiences. In most cases, this kind of back-and-forth sharing seemed to speed along the process of developing comfortable relationships with most of my speakers. At times, it appears to have facilitated discussion of rather personal issues related to sex and the body that might be off-limits in “mixed company”. I was also undoubtedly given access to spaces, as a trans person, that a non-trans person would not be granted. The most significant of these was the weekly transmasculine support and discussion group at the community drop-in center that I often attended. The group was open only to those who place themselves on the transmasculine identity spectrum and I was welcomed as a researcher even though the group’s privacy policy prevented me from recording or making notes. Despite those limits, participating certainly enriched my understanding of the local community, and the fact that several of my research participants attended this group allowed me to learn more about their lives and observe their ongoing interactions with other transmasculine people.

Of course, simply being trans does not mean that I am “the same” as my research participants. As numerous social scientists writing about power in the research relationship have pointed out (Cameron et al. 1993 for example), there is always an imbalance between researcher and researched based on the power of the former to represent and produce knowledge about the latter. But there were other important differences too, even just within the domain of trans identity. First, while my participants were still in the early stages of their transition process, for me that process took place over a decade ago. In some ways, I can recognize earlier incarnations of my own identities reflected in my speakers; as I said earlier, this is not to imply that everyone eventually “evolves” to the same type of transmasculinity I or other post-transition trans men express, but that my interactions evoked in me a feeling of connection between my participants and memories of myself in years past. On the other hand, much has changed in the past decade for trans people, and I sometimes find myself surprised by new standards in the community (as, for instance, on the night that I was one of only three people, out of a group of more than 10, who said they intended to stay on testosterone on a permanent basis – which, as I said, was once the norm). Second, my experiences differ from my transmasculine speakers because I began my transition at the unusually

young age of 14-15 years old. While most of my participants emphasized the significance of their time living as a woman, I have no real first-hand knowledge of what it's like to live in a female social role as an adult. This is related to a third major difference, which is that most of my subjects see their trans identity as a crucial part of their gender, while I see my own status as a trans person as more incidental to my gender identity as a man – on par with the place I grew up, the schools I attended, or the fact that I was enamored with technology from an early age. That is to say, my trans identity is important in my life as a whole, my politics, and to how I understand gender, but also feel closer affiliation with the unmarked category *man* over *trans man*. By contrast, my identity as a queer man is much more instrumental, in my view, in driving my disaffiliation from heteronormative masculinities. I point out these disjunctures between myself and my participants both to hold myself accountable for my own subjectivity and to point out that our purportedly shared trans histories at times generated friction (if only in my own mind) as well as solidarity. Handily, the ideal in many trans communities of treating self-identification as the single most important source of authentic identity can often ease inter-personal clashes that arise when it comes to the ways trans individuals understand their gender identities (which, again, takes a stance of privileged neoliberal individualism).

The point I wish to drive home in this section is that one cannot assume that a researcher simply being a member of the same (imagined) community as their research subjects is enough to bring about agreement on the nature of that community or on its core values. What my fieldwork has taught me is that we must reflect not only on *whether* the ethnographer is a community member, by the standards of the participants, but also *what kind* of community member they might be. In addition to being recognized as trans, I was also often cast in the role of knowledgeable “veteran” of the community. Participants would ask my advice about testosterone and other aspects of health care, about accessing various sources of information and support, and about personal struggles surrounding their transition or coming out process. I offered whatever help I could in these contexts, and through this process I saw myself becoming a more and more influential force in the lives of my subjects. One of the things I hoped to observe was their

socialization into the trans community. By telling my own stories and answering questions, I realized that I was actually playing an instrumental part in that socialization process.

Because of the aspects of my gender identity I have described – my preference for being seen as a “man” rather than a “trans man”, along with my status as a post-transition trans person who is afforded a great deal of privilege for not being visibly trans – made the choice to disclose my trans status in this dissertation a difficult one. I have long subscribed to the school of reflexive ethnography that says fieldworkers should consider how their identities are relevant to their fieldwork, but the idea of making this aspect of my identity public, on a permanent basis, evokes a mixture of anxiety and uncertainty in me. It isn't the fact that discrimination against trans people remains legal in most American jurisdictions. It isn't even the possibility that such a disclosure could potentially impede my academic success and respectability (Dozier nd; Stryker 2008b). It has more to do with the way being openly trans makes one's gender identity and presentation open for comment, scrutiny, and misinterpretation. As I have written about in other spaces (Zimman 2009), motivated by obvious personal implications, for some people coming out as trans can undermine the visibility of their gender identity rather than enhancing it. For people who prefer to be seen by others as men or women rather than trans men or trans women – people like me – disclosing a trans identity rarely leads to the feeling of being more fully seen or recognized by others. Instead, disclosure often leads others to change their perspectives away from the identity I claim for myself (“man”) and toward some other identity that I do not align myself with (e.g. “trans man”, “woman”, “biologically female,” “transgender person who is not fully male or female”). I have similarly found that coming out as trans can undermine my identity as a queer man who self-consciously rejects normatively masculine styles of speaking and expression. The knowledge that I am trans can lead someone to quite suddenly recast my gender expression as a sign of female socialization or failure to acquire normative masculinity, rather than a sign of which types of masculinity I embrace. Many reflexive ethnographers have remarked on the lack of control that researchers have over the way others view them (e.g. Wertheim 2009, Tewksbury & Gagné 1997), and this is as true for the researcher's academic audience as it is for the fieldworker in the field. So, ultimately, I do what little I can: I invoke

the privilege that comes with academic authorship and claim this space to give an account of myself. I find myself hoping that this section does not come across as an indulgent confessional, though I also believe it risks coming across as such in large part because the perspective I claim is marked and stigmatized. But my goal is ultimately scholarly: to consider the ways my social subjectivity, as a trans person, influenced the way I conducted my research and the data I collected. What this means, by logical extension, is that being a non-trans person also influences a researcher's perspective, though these influences tend to go unnoticed because they are socially unmarked.

The most important reason I cannot ignore my position as a trans researcher is the overt significance of my own voice in some of my interactions with participants. My voice was at times commented upon directly, particularly with respect to its relatively low pitch. On the other hand, my voice has often been described as “gay-sounding,” which is a designation I embrace as a means of indexing my queer identity and my disinterest in hegemonic masculinity. My voice could be taken, then, as an example of how a trans man's voice might sound after transition is complete – an issue of great interest to my participants. The precise implications of this perspective, however, is a bit less clear. Perhaps some speakers interpret my voice as a potential model for sounding male without sounding macho, which might lead them to feel more comfortable producing a non-normative masculine voice. Or perhaps they see it as evidence that trans men's voices can retain some signs of their feminine socialization, which might motivate them to work harder at achieving a more normatively masculine voice than the one I possess. Whatever the value attached to it, my voice represents one possibility for their imagination of a post-transition future, which is an issue I explore in greater depth in chapter 4.

I hope the picture I have painted so far is not too rose-tinted, as my intention is not to deny the special limitations that also arise for native ethnographers. For one thing, it is difficult to play the role of the naïve learner when one is recognized as a competent community member, or even accorded expert status. I often found myself having to probe my research participants for deeper explanations when the assumption of shared knowledge led to certain points being left unsaid. To take a simple example, a speaker I call Dave once told me about his distaste for the term *tranny* without explaining what his

objections were.²⁵ Because it was important to my status in the community that I not appear to be ignorant about the controversy surrounding this word, I asked that he explain it for the sake of the audio recording (i.e. for my future academic audience). My requests of this sort were obliged, but clearly this type of exchange brings us outside of the usual realm of conversation between community insiders. The consequences for blunders made by native ethnographers may also sometimes be higher than those committed by people seen as novices, and may result in more lasting damage to the researcher's community standing.

Particularly from scholars who do not practice ethnography, concern is sometimes expressed that community insiders will be more likely to allow their personal beliefs to influence their research than outsiders would. I once received a strong warning from a phonetician that my trans status makes my study more susceptible to bias than it would be if I were cis. The assumption embedded in this directive is that only trans people have a stake in the representation of trans identity, which strikes me as on par with the suggestion that only women have a stake in the representation of gender, and that women are therefore more likely to be biased than men when researching gender. Though my community membership makes my subjectivity as a researcher more apparent, non-trans researchers have a stake in the representation of trans people as well. Their stake can be seen, occasionally, in the confessions of these very researchers. For example, Bernice Hausman (1995) writes about being pregnant while writing her book on transsexuality and her genuine "worry" that she would "give birth to a hermaphrodite" (p. x). Tewksbury and Gagné (1997) report on the discomfort Gagné experienced when she was making her first contacts with the transgender community she worked with (Gagné & Tewksbury 1998) and found herself facing questions and assumptions about her own trans status and her motivations for conducting her research.

²⁵ *Tranny* has often been used as a slur, and some trans men and others on the transmasculine spectrum have reclaimed and resignified it. However, over the past few years trans women and people on the transfeminine spectrum have begun arguing that that transmasculine people cannot legitimately "reclaim" this word, because it has not historically been used against them. Because the word has strongly negative connotations to transfeminine people (who tend not to use the term as a self-identifier with the same frequency as transmasculine people, and are far more likely to have it used against them), transmasculine people have started to express solidarity by bringing up the problems with the word even in spaces where no transfeminine people are present.

Valentine (2007), in an entirely different tone, discusses how his identity as a non-trans gay man is part of what drives him to understand the relationship between trans and gay identities. Regardless of how (or whether) they describe their feelings about trans people, all researchers have some stake in the description of trans people because defining this population creates an implicit definition for non-trans people as well. As Clifford (1986) notes, ethnography in any context is a means of positioning self as well as other. If trans people are represented as co-opting and needing to be taught how to mimic the gender performances of non-trans people, for instance, non-trans people are framed as the bearers of authentic masculinity or femininity (as we see in chapter 4). By contrast, authors who argue that trans and non-trans people alike engage in comparable practices to construct their gender identities cast the two groups as equal with respect to gendered realness. Both stances have both personal and political implications, whether or not a scholar thinks of their analysis in those terms. Even the most basic choices – whether to use a trans person’s preferred pronouns, or whether to label non-trans people *cis*, *biologically (fe)male*, or leaving them as unmarked (*wo)men* – involves taking a stance with personal and political implications.

Stryker, an historian who has been among the most significant contributors to the growing field of trans studies, has critiqued academia’s disavowal of certain forms of knowledge as non-academic. In an article in the *Radical History Review*, she (2008b) gives a history of *homonormativity*, which she uses as a way of talking about how trans phenomena are either subsumed under gay experience or segregated from gays, lesbians, and bisexuals, and are instead treated as a separate group that is a sort of third gender. In addition to her role as a trans historian (2008a, b), Stryker has also been a participant in the past few decades of trans history as an activist and community member. Writing on the basis of her direct participation in and observations of the community, she describes the rise of new terminology, including *transgender*, *queer*, and *LGBT*, in the 1990s, and the words’ relationships to homonormativity. Treating the Stonewall riots as a symbol of the historical erasure of trans people,²⁶ Stryker gives an alternative,

²⁶ Many participants in the events at Stonewall in 1969 were *femme queens* and others who might today be identified as transgender (though see Valentine 2007), yet its historical narrative is generally one of gay liberation, with little reference to the role of gender variance in the community that frequented the Stonewall Inn.

anti-homonormative reading of a similar uprising by gay men and (self-identified) street queens that took place in San Francisco's Tenderloin district in 1966. Stryker's discussion thus provides genuine historical insight on a little known event, as well as analysis of the forces that kept the riots out of the historical record. Yet her work was deemed more "personal" than academic, and – as she discusses in the essay – her contribution was assigned to the non-academic sections of the *Radical History Review* labeled "Reflections" and "Public History," which are held to different editorial standards than the journal's main features. Though not part of Stryker's discussion, "native" anthropology could be included as one type of the under-valued *embodied knowledge* Stryker discusses – that is, knowledge produced through personal experiences moving through the world. All forms of knowledge production, of course, are embodied in some sense or another, as all researchers have, and do their research with, bodies. Yet the production of knowledge through the embodied experiences Stryker describes as a trans woman are not suitable for academic consumption, while the knowledge produced by normative bodies remains unmarked and thereby erases the importance of the author's embodiment. But the blurring of lines between researcher and researched, between knowledge producer and object to be known, chip at the foundations of scientific distance and objectivity. Insofar as this process exposes false boundaries and unacknowledged biases, this is surely a change for the better.

3.6 Conclusion

In this chapter, I have described my approach to conducting sociophonetic, ethnographic fieldwork among transmasculine speakers in the San Francisco Bay Area. As I have begun to show, ethnographic engagement allows for a much more in-depth account of participants' identities, beliefs, and linguistic practices than most other methods available to sociocultural linguists. This will become particularly evident in chapter 6, where I draw on my participant-observation in order to explain the gendered speaking styles employed by the participants in my study.

As Blommaert and Dong (2010) have written, ethnography has great critical potential for sociocultural linguists. It is devoted to questioning folk theories of cultural phenomena and other

explanations that draw on intuition, common sense, and the narratives of the socially powerful. In this way, anthropological research has the power to undermine hegemonic forces by providing alternative, relativistic accounts of the lives of socially marginalized persons. Power relations are an inevitable part of any holistic understanding of social context, according to Blommaert and Dong, and once these issues have been identified it often becomes clear that researchers themselves are implicated in the reproduction of cultural ideologies (or, at times, in undermining them). The critical potential of this dissertation has three parts: First, my research challenges the assumption that trans people's gender identities are somehow more artificial than non-trans people's, and that this artificiality stems in part from the fundamental importance and unchangability of biological sex. Second, I question the expectation that trans people are a homogenous community that can and should be lumped together (or perhaps split into two or three subgroups) any more than non-trans men or women can be treated as a single social group. Finally, I argue that my data does not support the still-circulating claim that trans people adhere to hyper-normative expectations about gender. In all cases, I argue that the voice gives a key vantage point to explore these issues.

CHAPTER 4

VOICING GENDER NORMATIVITY: LANGUAGE IDEOLOGIES ABOUT TRANS VOICES

4.1 Introduction

In my review of the literature on gender differences in the voice (chapter 2), I discussed the tendency in this body of work for researchers to look to sexual differentiation between male and female bodies in order to explain differences between men's and women's voices. This reliance on biology to explain gender is underpinned by language ideologies that naturalize certain types of gendered language use over others. In this chapter, I explore the language ideologies in a related body of literature: research on transgender people's voices produced by speech pathologists. The fact that most research on trans voices has been carried out by members of this field is driven in large part by the demand for speech therapy among trans women in particular. Trans men, by contrast, have been the subject of only a handful of phonetically-oriented studies, in part because testosterone therapy is known to lower vocal pitch markedly and trans men are therefore thought not to need speech therapy in order to sound male. Yet there is a growing body of literature on voice masculinization that is designed in part to bring voice therapy services to trans men. I summarize common ideologies that appear across this body of literature, which reveal an unsettling pattern of valorizing and literally promoting a very narrow range of "acceptable" gender presentations while pathologizing less socially normative ways of expressing gender. I contrast these ideologies about gender and the voice with those articulated by the transmasculine people I recorded as part of this project, as well as texts about the voice that circulate in transmasculine communities. In this discussion, I draw on three sources of data. First, I examine the common language ideologies that appear in research on transgender voices based on more than 15 articles published between 1978 and 2011

(Bralley et al. 1978; Mount & Salmon 1988; Spencer 1988; Günzburger 1989, 1993, 1995; McFadden, Pasanen & Callway 1998; Gelfer 1999; Gelfer & Schofield 2000; van Borsel et al. 2000; Dacakis 2002; Gelfer & Mikos 2005; Adler & van Borsel 2006; Davies & Goldberg 2006a, b; T'Sjoen et al. 2006; Owen & Hancock 2011). Second, I turn to metalinguistic commentary collected from interviews and semi-structured conversations with participants in my fieldwork. I also draw from online resources that have circulated for years in transmasculine communities. I show that speech pathologists' collective construction of trans voices naturalizes binary gender differences as the product of sexual biology while reinforcing the pathologization of transgender identity and erasing non-normative gender expressions. Distinctly white, middle-class, mainstream American forms of gender normativity are valorized, and trans people are assumed to universally aspire to this particular vision of heteronormative womanhood (or, less often, manhood). As these discourses have spread to the newly emerging literature on trans men's voices, ideological clashes become apparent between the language ideologies in speech pathology research and those in my participants' metalinguistic commentary. Transmasculine people also often naturalize the male voice as a product of hormonal sex, but they also frequently reject the notion that they should put effort into sounding like gender normative men. Although the few studies of trans men's voices that have been published suggest that members of this group could benefit from speech therapy, I argue that radical reformulations of the relationship between gender and the voice are needed if speech therapists hope to reach out to this community. More importantly, for the purposes of this dissertation, is the fact that these language ideologies provide the ground on which transmasculine voices change, as chapter 6 will discuss.

4.2 Language ideologies in the speech pathology literature

Language ideologies act “as a mediating link between social structures and forms of talk” (Woolard and Schieffelin 1994:55). I follow Silverstein's (1979) definition of language ideologies as “sets of beliefs about language articulated by users as a rationalization or justification of perceived language structure and use” (p. 193). I also make reference to Irvine and Gal's (2000) framework for language ideology, which identifies three primary processes through which our beliefs about language are constructed. First,

iconization involves framing a linguistic feature or variety as a literal and direct representation of some social quality or archetype associated with its speakers. The association between form and meaning is treated as iconic, rather than arbitrary (Peirce 1955). This is how we can characterize the ideology, already introduced, that gender differences in the voice are direct representations of sex differences in the body, rather than being socially mediated and culture-specific. Differences in vocal pitch, then, are framed as iconic reflections of differences between men's and women's bodies. In the phonetic research, iconization also appears in explanations for gender differences in formant frequencies: women's apparent use of a smaller vocal tract space has been explained in terms of an iconic link between body size and vocal tract size. Second, *fractal recursivity* refers to the projection of one ideological opposition onto another. To take another example from chapter 2, the phonetic traits associated with differences between men's and women's voices (e.g. women have higher fundamental frequency and formant frequencies than men) are projected onto expectations about differences between straight and gay men's speech. That is, gay men are expected to speak more like "women" (as a homogenized group), while straight men are expected to sound more like "men" (i.e. gender normative men). Fractal recursivity reveals much about the ideological connection between the two dichotomies that are being linked together, as this example suggests. Finally, *erasure* is the process whereby evidence that contradicts a language ideology is treated as though it does not exist. For instance, theories of gender difference in the voice tend to construct 'male' and 'female' voices as binary, oppositional categories by ignoring those who fall somewhere on the continuum between the two or who otherwise fail to adhere to gender norms for their assigned sex.

With this framework in mind, I now review of some of the most persistent language ideologies that appear in the speech pathology research on transgender voices. Until recently, all of this work focused on trans women, which is reflected in the quotes provided in this section. In some ways, the framing of trans identity has shifted over the last few decades, particularly with respect to authors' overt evaluations and basic terminology. For instance, Bralley et al.'s (1978) reference to male-to-female trans people as *male transsexuals* was par for the course when they were doing their work in the 1970s. By contrast, the practical guide published by Gelfer (1999) recommends that clinicians use their clients'

preferred names and pronouns (though this trend is not universal; e.g. McFadden, Pasanen and Callways 1997 also refer to trans women as male). Despite the fact that some of the articles I cite are decades old, the trends I identify are persistent in literature from the last 10 years as well. Furthermore, all of this work continues to be drawn on by researchers and clinicians alike who are interested in issues surrounding voice feminization and masculinization.

1. Gender differences in the voice are naturalized.

I discussed in chapter 2 that gender differences in the voice are socially mediated, rather than driven by biology. Yet the literature on trans voices, like other phonetic research on the gendered voice, most typically frames men's and women's voices as the direct product of physiological differences between the sexes. Although testosterone is widely known to affect the larynges of female-to-male individuals, studies of male-to-female trans voices emphasize that "hormone therapy (estrogen) for the genetic male does not affect the vocal folds" reaching conclusions like this one: "the natural voice pitch of the male-to-female transsexual remains at a lower level, completely at odds with a new female role, unless change is attempted" (Wolfe et al. 1990:43). Gelfer and Mikos (2005) write that "[a]cquiring the voice characteristics of the reassigned gender is a particular challenge for male-to-female transgendered persons, because the vocal mechanism in most cases has attained adult male dimensions, and it is not affected by the administration of female hormones" (p. 545).²⁷ In addition to reflecting the example of iconization I provided above, this ideological move follows the pattern of fractal recursivity, in which the naturalized binary difference between male and female bodies is projected onto male and female voices – as if speech were produced by physiology alone.

2. Trans women are framed as needing agentive intervention in order to sound like women.

²⁷ Notably, it does not appear that this claim has been empirically verified; on the one hand estrogen is assumed to have no effect on trans women's voices, though I discussed several authors in chapter 1 who claim (perhaps speciously) that estrogen contributes to greater articulatory precision (Whiteside et al. 2004a; Wadnerkar et al. 2006).

Because trans women are thought to have male voices by nature, authors in this body of work assume that they need help overcoming their “natural voices” in order to achieve “female-like speech” (Spencer 1988), a dichotomy is constructed between biologically determined gender differences, which give us our “natural voice,” and self-consciously chosen speaking styles, which can to some extent overcome those natural tendencies. For example, Spencer claims that “speech changes which result in a ‘female-sounding’ voice represent deliberate acquisition of specific behaviors rather than the effects of hormone therapy” (1988:40). The possibility that trans women might sound female without explicit instruction is not usually considered (though Gelfer 1999 gives credence to this possibility), which may be in part because trans people fitting this description are unlikely to seek out speech therapy. Importantly, trans women who do not feel they need speech therapy because they developed identifiably feminine-sounding ways of speaking earlier in life are also more likely to have a life history of economic marginalization by virtue of their femininity and gender non-conformity, limiting their access to speech therapy.²⁸ But these trans women are erased from the research. Invoking the writings of Blanchard, one of the most controversial researchers working in trans communities,²⁹ Gelfer (1999) says that “[t]he typical male-to-female

²⁸ For instance, a survey of 6,450 transgender people from the United States (Grant et al 2011) found that 78% of respondents who expressed their transgender identity or gender non-conformity before leaving high school (which, in the case of male-assigned people, means expressing femininity as a youth). The survey further considered the relationship between income and mistreatment in school by virtue of their gender expression. The authors of the summary then show that having experienced mistreatment in school correlated with income in adulthood. 36% of trans people who were mistreated in school by virtue of their gender expression made under \$20,000 per year, while only 23% of trans people who were not mistreated in school made that little (compared to 13% of the general population). Likewise, only 30% of trans people mistreated in school made over \$50,000 per year, while 46% of trans people not mistreated in school made that much (compared with 58% of the general population).

²⁹ The controversy surrounding Blanchard’s (1985, *inter alia*) work centers around his claim that trans women can be divided into two types: 1) homosexuals (i.e. trans women who are attracted to men and only men) who have long histories of feminine gender presentations and tend to transition at an early age, and 2) autogynephiliacs (i.e. trans women who are aroused by the idea of being physically female), who are attracted to women and have usually spent their pre-transition lives as gender normative straight men. Researchers and trans authors have critiqued Blanchard’s theories (e.g. Serano 2010) on numerous bases, including the fact that he prioritizes assigned sex over trans people’s self-identified genders; he treats trans women’s transitions as sexually motivated rather than based on an internally-felt affiliation with one gender or the other; he dismisses trans women who say they are not autogynephiliacs despite being attracted to women as deceptive or in denial and thereby manages to fit everyone neatly into his theory; and Blanchard’s theory presupposes that non-trans women are not aroused by their own femininity and/or

transsexual seeking the services of a speech-language pathologist is likely to be middle-aged (Blanchard, 1994), married or previously married to a woman, and the father of one or more children [...]. It is also common for transgendered individuals to have (or have had) traditionally male-oriented occupations. Many have served in a branch of the military or have worked in law enforcement, construction, or some other stereotypically masculine field.” (p. 202). Gelfer’s goal is apparently to encourage the reader not to be surprised if they find themselves with clients who have a history of masculine self-presentation, yet this focus on the masculinity of trans women paints a portrait that converges with the first ideology I discussed: that trans women’s natural, default gendered state is one of maleness and masculinity.

3. Trans voices and identities are pathologized.

In constructing the argument that trans people need speech therapy, the researchers in the articles under analysis tend to draw on pathologizing language – which should probably be expected from members of a profession driven by the identification of certain ways of speaking as pathological and others as normal. For example, Gelfer and Schofield (2000) write that “[a]mong adults with communication disorders, a small but fascinating population includes transsexuals” (p. 22). But it is unclear exactly what “communication disorder” is being diagnosed here; surely having a male-sounding voice is not in and of itself an indication of pathology. T’Sjoen et al. (2006) apply a series of measures designed to inventory disordered speech and quantify the degree of pathology present in trans men’s and women’s voices. This type of characterization of trans voices sits alongside some of the pathologizing discourses about trans identity, and can be understood as an instance of iconization: trans voices are pathological because trans persons are pathological.³⁰ Trans people are at times contrasted with “normal” speakers (Wolfe et al. 1990:43), information about speakers’ genitals is routinely included in their descriptions, and trans identity is usually defined in clinical terms that recall the diagnostic language of Gender Identity Disorder

having a female body. However, a few self-identified autogynephiliacs have written in support of his work (Lawrence 2011).

³⁰ Thanks to Arthur Speer for making this point explicitly as discussant for a panel on the legacies of language pathology at the 2011 meeting of the American Anthropological Association.

from psychologists' *DSM-IV* (American Psychiatric Association 1994); e.g. "A transgendered individual strongly believes that his or her true psychological gender identity is not congruent with his or her biological or physical gender." (Gelfer & Schofield 2000:22). As I mentioned earlier, even in the last fifteen years we can find examples of researchers like McFadden, Pasanen, and Callways (1997) referring to their trans woman speaker as a "male transsexual," although this language had already become antiquated in their field of psychology by the time of their publication. Presumably, these authors' choice and similar choices made by other researchers in the past to refer to trans women as male rests on the mantle of scientific objectivity that prioritizes biological sex as an observable and purportedly immutable fact and dismisses gender identity as a social construct that is harder to observe or measure (see more on the naturalization "sex" in chapter 6). Though they may be attempting to avoid the overtly political stance involved in giving credence to trans people's "beliefs" about their gender identities, the stance these authors take instead has equally significant political implications.

Other forms of gender non-normativity are also pathologized in this literature, primarily through the insistence from numerous authors that trans people may injure their voices if they attempt to feminize (or masculinize) them without professional supervision. The implication is that people with "male" voices who speak in "feminine" ways are doing something that creates risk of physical damage. By contrast, speaking in accordance with gender norms for one's sex is apparently not thought of as physically dangerous despite the fact that we know men and women both tend to engage in their own forms of vocal masculinization and feminization that take them beyond the discrepancy that biological differences on their own would predict. Gender normative cis speakers' articulatory strategies are naturalized, while male femininity and female masculinity are implicitly stigmatized and erased. This erasure and the concomittant conflation of "(wo)men" and "gender normative cis (wo)men" occurs just as it does in much of the phonetic literature on gender and the voice.

4. Given that trans women have pathological, male voices needing active intervention and change in order to sound like women's voices, speech therapists are needed.

The language ideologies in the speech pathology literature suggest that speech therapists are necessary to teach trans women how to sound like women, to help them avoid injury, and to make sure they get it right. For instance, Bralley et al. (1978) and Günzburger (1989) argue (in suspiciously identical language) that “consideration should be given to treatment by a qualified professional in the area of speech pathology [...] to prevent adoption of the distinct ‘effeminate male’ quality resorted to by some transsexuals (Shaughnessy 1975) in lieu of the female quality that is desired” (Bralley et al. 1978:448). Trans women’s own efforts to feminize their voices may be cast as “inappropriate” without much explanation: “practice was necessary to overcome inappropriate patterns adopted by the patient in her pretherapy attempts to develop a feminine voice” (Mount & Salmon 1988:233). Gelfer (1990) similarly claims that it’s harder to train trans women to change their pitch and other gendered characteristics than it is to do this work with “non-gender change” clients, because trans women are less likely to know “gender-appropriate ways of modulating pitch” (p. 8).

5. Assumptions are made about clients’ goals, success is defined in terms of gender normativity, and non-trans clinicians are positioned as the arbiters of acceptable femininity.

The quote offered by Bralley et al. (1977) and Gelfer (1989) gives us a sense of what kinds of assumptions researchers and clinicians make about trans clients’ goals. Specifically, trans women are assumed to want to sound like straight, gender-normative non-trans women who also embody white, middle-class, American femininity (see ideology 6 below). When Gelfer refers to successful trans women clients as speaking with an “acceptable” female voice (1990:1) and Spencer (1988) describes more feminine-sounding trans women in her study as having “more adequate speech patterns” (p. 39), it is against a specific, highly privileged norm that trans women are being compared. Gelfer and Schofield (2000) describe their perception of trans women’s goals explicitly: “In addition to achieving a physical appearance and bodily configuration consistent with the new gender, the attainment of appropriate speech and voice characteristics is also a desired goal for the transgendered client” (p. 22, emphasis added). Even where trans women suggest they might have different goals, the insistence on gender normativity may

persist, as when Spencer remarks with wonder that all of her clients were satisfied with their voices despite the fact that not all were perceived as female speakers in decontextualized experimental contexts. She concludes that the trans women perceived as men must be mistaken about how they sound: “subjective clients reports of the adequacy of the speech product may not be valid” (p. 40). One recent article that shows movement away from this trend is that of Owen & Hancock (2011), who measure trans women’s self-perceived femininity as well as the perceptions of listeners from a similar experimental context. Even in this case, however, the focus remains on comparing trans women to non-trans standards of normative femininity and providing guidance for the speech therapist to help trans clients reach that goal.

Gelfer (1999) invites clinicians to offer critiques of speakers’ gestures and other aspects of their clients’ enactments of femininity. Since speech therapists aren’t given training in body language or any non-voice related aspect of gender expression, their authority seems to rest on their assumed status as gender normative non-trans women (women forming the majority of practicing speech therapists). This authority is made more clear when clinicians are used as literal models of appropriate femininity. Mount and Salmon (1988) provide an example of this practice, in which one of the authors used recordings of her own voice and asked her clients to listen to and directly mimic the pitch contours she produced. Several authors in this set of papers warn that trans women may not be capable of fully achieving the norm set out by their therapists, but none questions whether it is appropriate for the clinician to cast herself as an example of “acceptable” femininity toward which the client is encouraged to strive.

6. Gender non-normative women, working-class women, women of color, and women who are not native speakers of the locally dominant language (usually American English) are erased.

Importantly, the particular forms of femininity that speech therapists promote is based on studies of gender and the voice often conducted with white, middle-class American university students acting as representatives for “women” and “men” as a whole. If an individual clinician *were* to recognize that some

trans women might prefer to sound like lesbians, women of color, masculine women, working-class women, and/or trans women, there is almost no research to help the speech therapist facilitate such a goal.

4.3 Ideologies about transmasculine voices

It is only in the last decade or so that the voices of female-to-male trans people have been the subject of acoustic analysis (van Borsel et al. 2000; Adler & van Borsel 2006; Damrose 2009; Papp 2011). As I have mentioned, trans men's voices are known to drop in pitch with testosterone use, and members of this group do not typically seek out speech therapy. Because testosterone is a mainstay of female-to-male medical transition, the received wisdom is that trans men do not need speech therapy in order to sound like men. In his (1999) review of language and transgender, Kulick argues that this assumption – that trans women need speech therapy while trans men do not – reflects and perpetuates the naturalization of masculine speaking styles and the treatment of femininity as artificial and achieved only through careful training. Since Kulick's publication (though probably not because of it), a handful of studies on trans men's voices by speech pathologists have begun to question the assumed primacy of testosterone-fueled changes as well. In fact, the few publications in this area have argued that trans men could benefit from speech therapy. *Benefit*, here, usually takes on the same meaning as it does in the literature on trans women's voices: speech therapy could help them sound more like heteronormative non-trans men. A contrast here is the work of Papp, a linguist, who points out that trans men may be happy with a non-normatively masculine voice, even as she offers measures relevant to speech therapists.

The idea of *passing*, or being perceived as a member of one's self-identified gender, has a central and yet highly problematized status in many trans communities, including those in which I conducted my fieldwork. On the one hand, transmasculine people who are not perceived as they want to be often talk about passing as goal, or express frustration at their inability to pass. Since most of my participants were early in their transitions when I started recording them and thus still negotiating their "passability," references to passing were not uncommon in my conversations with them. At the same time, when participants in my study talked about passing, they often signaled their awareness of the problems with

the term – e.g. by gesturing scare quotes with their fingers. The main objection to the word *passing* in this context is it generally refers to people who are perceived as members of a group that they are, in reality, not members of. That is, people of color have at times passed as white despite not being white; gays and lesbians may similarly pass as straight despite not being straight.³¹ Despite objections over the word itself, it is often of great importance – especially those early in transition or who are not making use of hormones – to manage their gender presentations. The choice to go on testosterone, for my participants, was most typically motivated by a desire to be recognized as male or masculine by others. Many also invoked an internal sense of what they feel their body should be like (which is the focus of Prosser 1998), but the social perceptions of others was an important factor for everyone in my study.

Because of the interest transmasculine people may have in shaping their self-presentation in order to “pass” as men, a genre of texts known as *passing tips* have circulated in online trans communities. This information is then disseminated within local communities. One website, “The FTM Passing Tips Site,”³² which has existed in its current form for well over a decade, features advice on a range of topics from clothing and haircuts to swimming and negotiating men’s restrooms. As we will see below from one of my participants, the very idea of advice for passing is heavily problematized by community members.³³ Some example tips from this site include the following:

- *If you live in a cosmopolitan area where there are a lot of butch lesbians then it's going to be much more difficult for you to pass. One way to help distinguish yourself from them is to dress more conservatively - you might want to leave the leather motorcycle jacket at home for a while.*

³¹ An additional complication to passing, for trans people, is that “passing as a man” doesn’t just mean being perceived as man, but also being assumed to be a **cis** man. Serano (2007) and Edelman (2009) point out that the word *passing* frames trans people as the agents behind this process, when in fact some trans people may “pass” despite not wanting to. According to these authors, passing is heavily informed by prevailing assumptions about what trans people look like. People who don’t “look trans,” according to these narrow expectations are assumed to be cis. Trans people who are not visibly trans, then, are treated as though they have acted deceitfully (as Serano discusses in depth).

³² Retrieved from <http://www.ftmpassingtips.com> on April 10, 2012.

³³ For example, the author of a blog entitled *Not Another Aidan* offers “tips for the newly out,” including advice to “fuck passing,” in which he rebuts many common tips. Retrieved from <http://notanotheraiden.com/tips-for-the-newly-out/> on April 10, 2012.

- *All-over crewcuts are also problematic because they emphasize the shape and size of one's skull and are therefore feminizing (look at Sinead O' Connor)*
- *Footwear can be a real problem if you have small feet, although you do save money if you can wear boys' athletic shoes.*

In contrast to the detailed advice about clothing, haircuts, different methods for *binding* (i.e. flattening one's chest), and the various options for *packing* (i.e. creating a bulge in the crotch of one's pants), relatively little guidance is available for masculinizing the voice. Like many of the passing tips on this site, the single sentence under the "voice" section of this website is phrased in terms of generalities about how women and men behave. It reads:

- *Women tend to use an upward inflection at the end of their sentences, while men tend to speak in more of a monotone.*

Despite the importance of pitch, it is not treated as something that can or should be consciously manipulated the way that the use of up-talk versus monotone intonation might be. In fact, the only other mention this website makes of gender differences in the voice is an insistence that testosterone is the way to achieve a lower-pitched voice:

- *The only safe and effective way to lower your voice, masculinize your body, and grow facial hair is to take testosterone under the care of a doctor. Any other way is ineffective and potentially hazardous to your health.*

In this way, the voice is framed differently from other semiotic indexes of gender, such as bodily hexis (Bourdieu 1984), how much a person talks, or what they talk about. Advice on "body language" is common in this genre of texts, with the same website asserting that, "Women tend to be less obtrusive, while men tend to take up more space. If you watch commuters on a bus, women tend to sit with their legs crossed and their arms drawn in, and men tend to sit with their legs apart and their arms out."

Sometimes prescriptions are context-specific, as when the section on bathrooms recommends not talking

to other men, or making eye contact, in the men's room. Other websites³⁴ suggest being less talkative, not smiling as much, and avoiding "gossip." Yet the overall emphasis in transmasculine discourses of linguistic masculinization is on physiological changes brought about by testosterone. One site warns that:

- *Deepening your voice on the phone is fine and may be a good idea if you're on the high side, but don't try to deepen it when having a conversation in person. You can see it in a person's face when they're trying to change their voice.*³⁵

This brings us to the first language ideology invoked by participants in this study, which is that *testosterone will take care of (pretty much) everything*. And, indeed, changes in vocal pitch that I document in chapters 5 and 6, as well as the work of Papp (2011) and others, support the conclusion that testosterone most typically takes speakers from a pitch down into a range considered typical for men. Metalinguistic commentary from my study participants is instructive here. One of them, whom I call Mack, is a 46 year old white, straight-identified trans man who grew up in the Bay Area and currently works as a bus driver for a private charter company. During one of our many conversations in his home in the southern outskirts of San Francisco, Mack was telling me about some of his trans women friends and how hard they work in order to be recognized as female. In Excerpt 4.1, I ask him whether he thinks trans men tend to put in as much effort into masculinizing their appearance and behavior. Notably, Mack has been frustrated with the relatively slow speed at which his own voice has changed, yet he maintains confidence that testosterone will eventually do for him what it has done for other trans men.

Excerpt 4.1, Mack (at 49 weeks on testosterone)

01 MD: Yeah, she was really successful. And, but she was a really hard worker on
 02 everything. She was really committed to really really movin' through the
 03 world as female and not being clocked? [perceived as trans]
 04 LZ: Mhm.
 05 MD: Y'know?
 06 LZ: Do you think that trans guys in general are as committed t- to like, kind
 07 of, doing everything possible to,
 08 MD: In my experience, the trans guys and the trans women I've met, I'd say

³⁴ For example <http://www.tssupport.org/Tips/FTM>, http://www.t-vox.org/index.php?title=FTM_passing_tips, and <http://www.wikihow.com/Pass-As-a-Male-%28For-FTMs%29> retrieved on April 10, 2012.

³⁵ Retrieved from http://www.t-vox.org/index.php?title=FTM_passing_tips on April 10, 2012.

09 no, because guys know that testosterone's gonna eventually take care of
 10 everyth- pretty much everything.=
 11 LZ: =[Right.
 12 MD: [I myself have been lazy on some things because it's very easy to just
 13 go, well yeah, but in a year it's gonna be gone anyway,=
 14 LZ: R[ight.
 15 MD: [=y'know, in a year my voice is gonna be deep anyway,=
 16 LZ: Mhm.
 17 MD: =y'know. So I think, my experience has been that trans women work a lot
 18 harder.

From what I have observed, Mack has it right when he says that guys are confident that testosterone will masculinize their voices to an extent that gives them little motivation to work at speaking in a more typically masculine way (a point Papp 2011 alludes to as well). It is partly for this reason that trans men and other transmasculine people do not often talk about differences between men's and women's voices aside from pitch and, relatedly, intonation. In contrast with the few resources for voice masculinization, trans women have a larger body of knowledge on which to draw, including books and other guides produced by trans women themselves (e.g. James 2012, nd; also Laing 1989). In exit interviews with my participants, most were surprised to learn about the non-pitch-based variables in my analysis, especially [s]. By contrast, in conversations with trans women not involved in my project I have found many are familiar with both resonance and [s] as indices of gender. This is undoubtedly at least in part because trans women are unable to assume that hormonal processes will automatically feminize their voices. However, the important fact here is not simply that testosterone affects the voice while estrogen and other hormones trans women make use of do not. The more significant point is that the ideologies of transmasculine people on testosterone treat self-conscious masculinization as both unnecessary and, as the next ideology will show, undesirable.

The power of testosterone to bring about changes in the voice is not the only reason transmasculine people on testosterone give for their disavowals of agentive linguistic masculinization. The second language ideology expressed by the majority of the participants in this study centers around the idea that linguistic self-monitoring is contrary to the ultimate goal of a gender role transition: to express an authentic self that is masculine or male by nature. Some of the participants in my study felt it

was completely unnecessary to alter their speech, gesture, clothing, or any other aspect of their gender expression because they were already quite masculine. Adam, for example, is a 38 year old, white, queer-identified trans man who grew up in the New York City suburbs and works as a program director for an LGBT youth organization. He is the only speaker whose voice was occasionally perceived as male even before his transition, which is an unusual experience among trans men. Adam told me his self-presentation had been masculine for decades by the time he decided to transition medically, and never felt that masculinity required effort. When I asked my transmasculine participants whether they would consider putting in effort to speak in a more masculine way, I was told by several individuals that the driving force behind their transitions was a desire to more fully express what they feel to be an authentic sense of self. Even among the participants in my study whose gender presentations and voices are less typically masculine than Adam's, it was the norm to emphasize the value of authentic self-expression over normative masculinity.

When my participants did talk about trying to masculinize their voices, it was always framed as something they did at the beginning of their transitions, before their voices started to change from testosterone. I had a conversation on this topic about halfway through my year of recording Kyle, who is a 24 year old queer trans man who grew up in the Bay Area and now works as an environmental educator. During an afternoon we spent chatting in my cramped San Francisco apartment, Kyle told me about attempts he had made in the past to “squash” his natural effeminacy (Excerpt 4.2, lines 02-05). His efforts were motivated by wanting to be seen as male (line 06), which is something that was increasingly common for him at this point in his transition. The dialogue in Excerpt 4.2 comes from a conversation about Kyle's concern that his affiliation with local queer communities will become invisible now that he is being seen as a man and losing his status as a visibly gender non-conforming person. He relates his self-ascribed effeminacy back to this issue in lines 09-11, in which he refers to a conversation he had with his partner, a queer femme woman who has also struggled with maintaining visibility as a queer-identified person. Based on her experience dating other trans men, she told him that his natural inclination to mix certain aspects of femininity into his gender expression will help him negotiate recognition as a member

of the queer community. I discuss some of the linguistic manifestations of this kind of negotiation in chapter 6.

Excerpt 4.2, Kyle (at 32 weeks on testosterone)

01 KW: I have this, like, tendency, like, where like I think I'm naturally would
 02 describe myself as like kind of faggy or like an effeminate man.
 03 LZ: Mhm.
 04 KW: But as I'm transitioning I've like, not consciously, but subconsciously
 05 kind of like squashed a little of that natural, like, expression. Because
 06 I'm [like, "I really want to pass, I really want to be seen as male."=
 07 LZ: [Mm. Mhm.
 08 KW: =Um, that conversation has kind of come around that, where she's like,
 09 actually, like, it's kinda great that that's who you are, because that's
 10 going to be something that, uh, is going to help you be identified as
 11 visibly [queer and you're worried about what is that going to look like.
 12 LZ: [Mm.

Another participant who talked about trying to speak in a more masculine way toward the start of his transition was Dave, who is a 23 year old white, queer trans man from an upper-middle class Bay Area family who is an artist and currently unemployed. Dave now feels more comfortable expressing femininity than he did before he was consistently perceived as a man, particularly because it reflects his current identity as a fem queer man. As he puts it, “now that I read completely as male, [...] I’m just gonna sound like a faggot, it’s fine” (lines 09-10). Excerpt 4.3 comes from our last meeting, in which I asked him to reflect back on the ways his voice has changed, or not changed, during his transition so far.

Excerpt 4.3, Dave (at 112 weeks on testosterone)

01 LZ: Do you think anything other than your pitch has changed, as your voice
 02 has changed (.) since (.) transitioning?
 03 DM: I tried to swoop less, when I was early in transition. Like, I very much
 04 tried to sound like, more modulated masculine and have less of like the sort
 05 of queeny voice?
 06 LZ: Mhm.
 07 DM: I very consciously tried to do that and failed a lot 'cause I would forget.
 08 Um. But I've definitely stopped doing that now that I read completely a
 09 male, cause now I'm like fu:ck I'm just gonna sound like a faggot, it's
 10 fine. Who cares?

Dave has also developed an overtly political perspective on the passing tips I described above, which he told me about during one of our earliest meetings. As he sees it, the crux of both passing tips and speech therapy is the idea that a person should change themselves in order to meet others' expectations about how men and women look, act, and sound. When I asked Dave whether he thought people could be successful in self-monitoring their speech – given that Dave himself told me his attempts to “swoop less” did not succeed – he told me that he thinks people can be successful, but that “their success is something that [he] find[s] repulsive” (Excerpt 4.4, lines 03-04). Because he identifies strongly as a fem man, it is particularly important to Dave to make space in society for male-identified people whose voices fall outside of the expectations for heteronormative cis masculinity.

Excerpt 4.4, Dave (at 67 weeks on testosterone)

01 LZ: Do you think the passing tips, like about voice, like "talk in a monotone"
 02 or whatever, that people are successful, or can be successful in doing that?
 03 DM: I think they can, if they're that determined. Um, but their success is
 04 something I find repulsive, so. Like I'm in favor of them reading correctly
 05 as male and having that privilege and not that pressure in their life and
 06 I'm like mmm no. Not that way. Somebody has to fight the fight for men with
 07 flamboyant voices.

Notably, transmasculine people on testosterone generally do not talk about testosterone-induced pitch changes as a form of choosing to sound more masculine, at least not in the same way as manipulating intonational patterns. And for those whose voices are low-pitched enough to be perceived as male, they are able to ignore non-pitch-based phonetic indices of gender from a position of relative privilege that may not be available to those with higher-pitched voices. Some transmasculine people choose not to go on hormones in part as an extension of the argument Dave makes: that changing one's self-presentation in order to meet dominant expectations about how men and women sound involves a kind of capitulation to non-trans norms. Dave was the only participant in my study who now says he thinks he would have been content without the pitch change testosterone gave him, and that he would now feel confident enough to assert his identity as a man even with his old speaking voice, which he describes

as “soprano.” Ultimately, though, he felt happy with his deep voice, even as he recognizes the power struggles that underlay trans people’s linguistic choices.

My other participants do not directly address the tension between their choice to go on testosterone and their simultaneous belief that it is important to use an authentic speaking style. But one way we can understand this separation is by thinking about the way trans discourses of identity separate biological processes from the internal, “true” self. In these discourses, the authentic self transcends biology, which is what makes it possible for someone categorized as biologically female to see their self-identification as male as the more authentic representation of themselves. Kam, for example, is a 28 year old white, genderqueer, trans boy from working class Cincinnati who strongly resisted any pull to compromise his self-expression in order to “pass” as male. He was the only participant in this study who felt that binding his chest was not worth the effort or physical discomfort it cause, for instance, despite the fact that it made it more likely that he would be perceived as a woman. Like Dave, Kam recognized that his speaking style was far from the masculine norm because of his pitch range and variability, which was amplified by his frequent use of falsetto voice quality, and he had no interest in changing this aspect of his self-presentation. When I asked him how much his voice had changed so far, after five weeks on testosterone, he told me that it’s difficult to tell because he gets excited about his voice being lower, which leads him to start “squealing” out of happiness and brings his pitch back up. The talk from Excerpt 4.5 is what followed.

Excerpt 4.5. Kam (at 5 weeks on testosterone)

01 KK: Um, but, yeah. I feel like it's dropped just a tiny bit.
 02 LZ: Mhm. Do you still try to, like, control- like, y'know, keep it in the lower
 03 part of your range? or do you just kind of let it do its own thing.
 04 KK: Its:- in some spaces and at some times I'll find myself doing it, and I'm
 05 like, ^oh, what am I doing that for?^ And I'm like, ohh. I think I'm really,
 06 just, actually have always had like, a deeper register like when I'm just
 07 like having normal conversation and just like talking or whatever, but like
 08 when I'm ^excited,^ or when I'm like, whatever, like, my voice is much much
 09 higher?
 10 LZ: Mhm.
 11 KK: Um. Like, someone I am close to, like, described it as like, never:
 12 bothering or caring to learn male patterns of speech? ((laugh))
 13 LZ: Uh-huh ((laugh)) (xxx) yeah.
 14 KK: I mean he's, been on T for like 10 years, just about, and he still- his
 15 voice is low, but his like, on the phone he gets taken as female, um, all

16 the time because he never, he=
 17 LZ: Yeah.
 18 KK: =Claims that he's never bothered to learn or care ((laugh))
 19 LZ: Right, [yeah, (totally)].
 20 KK: [About how guys talk- or whatever.
 21 LZ: [Yeah [Yeah
 22 KK: [So he gets excited and [like, I'm like I feel like that will also be true
 23 of me.=
 24 LZ: Mhm.
 25 KK: =Like, I'm not- I'm, I'm just so like, I'm a giggly, bubbly, like, squealy
 26 type of person? ((laugh))
 27 LZ: Mhm.
 28 KK: Like, I feel like, as deep as it gets, is as deep as it'll get. But when I'm
 29 excited or when I'm like bouncing around or whatever, it'll do its,
 30 whatever.

Kam describes himself as unconcerned with shifting his intonation patterns to the point that, when he notices himself constraining the way he speaks, he asks “what am I doing that for?” (line 05), indicating that he questions his motivations for style-shifting across contexts. More, over, he asks this question of himself with falsetto voice quality, suggesting that his internal monologue incorporates this aspect of his voice. Repeating the word *squeal* to refer to his own voice for the second time in just a few minutes, Kam says that he’s just a “giggly, bubbly, like, squealy type of person” (lines 26-27) and doesn’t see that changing in the future. In so doing, he links his linguistic style – and his use of a pitch range that includes frequencies high enough to be described as a *squeal* – to his characterization of himself as a person. Despite all of these facts, Kam has no qualms about changing his voice with testosterone; in fact, he had told me about ten minutes earlier that his desire to lower his vocal pitch was the only reason he decided to go on hormones. By his account, his decision to go on testosterone did not conflict with his intent to maintain his gender presentation, which he also described as *femmey* and *faggy*.

Because the vocal changes that come with testosterone therapy are understood as physiological in nature, they do not inhibit expression of one’s true, inner self, just as transmasculine people see their bodies as separable from their internally-felt masculine identities. Instead, testosterone simply gives transmasculine people access to a physiological baseline that is seen as comparable to what non-trans men have. Once they can make use of a male-sounding pitch range, transmasculine speakers can potentially feel more free to **avoid** changing the stylistic elements of their speech and thereby continue expressing

what they experience as an authentic self while also tapping into the importance others place on gendered embodiment.

The tension between authenticity and the desire to control how one is perceived is captured by Dave when he says he is “in favor of [trans men] reading correctly as male and having that privilege and not that pressure in their life” and yet “I’m like mm no. Not that way” (Excerpt 4.4, lines 04-06), meaning that he doesn’t want people to have to restrict their authenticity in order to have their self-identified genders recognized and respected. Ideally, for Dave, recognition would be universally offered to trans people and biological sex would not be used to categorize a person’s gender. But given that that the world is less than ideal in this way, and that trans people whose perceived sex clashes with their self-defined gender identities engage in a constant fight for recognition from others, a conflict persists between the desire for recognition and the desire to feel authentic.

4.4 Reconciling speech therapy and transmasculine language ideologies

In some ways, the two sets of language ideologies I have discussed, from speech pathologists and from transmasculine people, converge. Biological sex is seen by both groups as key in producing male- and female-sounding voices, yet transmasculine people see sex as flexible rather than fixed at birth. Speech pathologists, however, have recently challenged the notion that testosterone provides sufficient masculinization for trans men to be perceived as male speakers. Adler and van Borsel’s (2006) discussion of trans men’s voices offers one of the only explicit guides to voice masculinization available to speech therapists. As I discussed above, the authors of this chapter, along with van Borsel et al.’s (2001) analysis of the same data, argue that more trans men could benefit from speech therapy, drawing on the same ideologies that have appeared in other speech pathologists’ writing about trans women: the primacy of biological sex, the necessity of speech therapists to judge the gender normativity of a trans voice, and the suggestion that non-trans speakers should be used as role models for trans men’s voices. Though it is wise to challenge the assumption that testosterone will “take care of everything,” as Kulick (1999) advises, these researchers have continued some of the same ideological trends I discussed in section 4.2. That is,

they seem to assume that if trans men knew about the other characteristics that make a voice sound female or male, they would want to change their voices to make them more like most non-trans men's. But the metalinguistic commentary I collected from transmasculine people in the San Francisco Bay Area suggests that it isn't just that trans men and others on testosterone are unaware of certain gendered acoustic traits – many of them are fundamentally uninterested in taking on linguistic expressions of normative masculinity.

I would like to close with a small group of exceptions in the body of literature on speech feminization and masculinization that I examined, beginning with the pair of reviews published in 2006 (a, b) by Davies, a speech therapist, and Goldberg, a trans community activist in Vancouver, Canada. This collaboration between clinician and community member produces the most culturally sensitive and theoretically sophisticated guide available, particularly when it comes to the ways gender normativity and transgender identity are conceptualized. The authors translate the results of many of the studies I have described here in ways that recognize three fundamental points: 1) that different trans people have different goals for their gender presentation, which reflect different relationships with gender, sexuality, race, class, native language, and other social positionalities, 2) that trans people often want access to information about norms for men's and women's voices, but this does not necessarily mean that they want to sound like socially normative non-trans men and women at all times, and 3) that trans people's expressions of masculinity and femininity are no more artificial than the gender expressions of non-trans individuals. Davies and Goldberg's framing of voice feminization and masculinization recognizes and affirms trans people's diverse identities, desires, and experiences. This goes a long way toward avoiding the ideological pitfalls I identified in the first part of this chapter. Similarly, McNamara (2007) discusses a series of workshops she designed to help trans men in London explore their vocal ranges and their ability to produce more typically masculine resonance, intonation, amplitude, and voice quality. Although the author recommends that more trans men take advantages of the services she provides, much as speech therapists do, the perspective she takes on the training itself is very flexible. The goal behind McNamara's project is to draw on dramatic exercises to allow trans men to experiment with difference voices, and to

provide affirmation and support to transmasculine vocal transitions. She also aims to denaturalize normatively gendered voices by encouraging her participants to see the voice as constructed and reconstructable rather than treating them as individuals who want to change their “natural” voices.

However, fundamental problems remain. First, little information exists on speech masculinization through means other than testosterone, leaving transmasculine people who do not make use of hormone therapy with few if any resources for changing their voices, despite the fact that this population is the most likely group to desire some kind of guidance on vocal masculinization. Second, it remains to be seen whether transmasculine people’s emphasis on linguistic authenticity can be reconciled with the fundamental point of speech therapy, which is to change an individual’s voice. Aside from individual preferences, there may also be a stigmatization of seeking help from a speech therapist among trans men. When I asked Mack if he would consider speech therapy if his voice didn’t lower further, he paused, seemingly flushed with emotion, before telling me that he would feel like a failure if he found himself making that choice.

And the most fundamental question, about the political implications of trans people striving for linguistic normativity, is left unaddressed. The tension I characterize here is not unlike the one that exists between sociolinguists and speech therapists who provide “accent reduction” and other services designed to help clients sound more like normative, non-stigmatized speakers. Sociolinguists, as dialectal relativists, cannot help but be worried by this phenomenon, in which members of marginalized social groups pay for services to help them assimilate to the linguistic variety that is the native dialect of more socially powerful groups, often based on the idea that their native variety is fundamentally incorrect. On the other hand, because linguistic discrimination is pervasive and has a real effect on the economic, social, and global mobility of speakers of stigmatized languages and dialects, it is difficult to argue that individual speakers should simply refuse to assimilate and accept any life-changing consequences that might result (see Lippi-Green 1997 for more discussion of dialect-based ideologies in the United States). It is my hope that descriptive sociolinguistic studies such as this dissertation (as well as more

acoustically-oriented research like Papp's) can empower transmasculine speakers with information while avoiding prescriptions about how they should speak.

Transmasculine people's lack of engagement with speech therapy and general lack of awareness about gender differences in the voice other than pitch and intonation are important parts of the social context in which we can situate transmasculine voices in transition. The ideological system I've described gives transmasculine people license to make use of non-normatively masculine speaking styles, so long as testosterone puts them in their desired pitch range. And, in fact, many of my participants embraced the semiotics of non-normative masculinities more generally, often identifying with queer/gay men, male nerds, dandies, feminists, metrosexuals, and so on. In chapter 6, I return to many of the issues presented in this chapter in order to show how the language ideologies of speakers in this study both motivate and explain their use of relatively non-normative masculine speaking styles.

CHAPTER 5

CHANGE OVER TIME IN TRANSMASCULINE VOICES: ACOUSTIC ANALYSIS OF READ SPEECH

5.1 Introduction

In this chapter I present findings from my acoustic analysis of read speech produced by the transmasculine individuals who participated in this study during their first (or sometimes second) year on testosterone. As I have mentioned, I focus on three acoustic variables, each of which has been linked to gender: fundamental frequency, formant frequencies, and the acoustic properties of [s]. In this chapter I focus on my acoustic findings, which I then contextualize and analyze with respect to sociocultural linguistic theory and context in chapter 6. This chapter includes two types of comparative findings: changes in individual speakers' voices over time and differences across these speakers.

In chapter 2, I discussed the various explanations offered for gendered patterns in the three acoustic measures in focus, with physiological sex playing a different role for each variable. First, fundamental frequency has long been linked to physiological differences between male and female bodies. Specifically, testosterone causes changes in the larynx that are associated with a lowering of fundamental frequency, or F0 (e.g. Hollien 1994, van Borsel et al. 2000, Evans et al. 2008, Papp 2011). This process occurs during a prototypical male puberty, as well as during hormone therapy among transmasculine people. We can predict, based on others' findings about the relationship between F0 and hormonal factors, that the speakers in this study will undergo a downward shift in vocal pitch during the early months of their testosterone therapy.

Vowel formants, by contrast, have a more contested relationship with biology, as I discussed at length in chapter 2. If formants are directly determined by height, we should expect no change in

formants for these speakers, who did not report becoming taller with testosterone.³⁶ If formant differences are due to testosterone causing the larynx to descend as well as enlarge, as some have proposed (Traunmüller 1984, Simpson 2009), we might expect to see a lengthening of the vocal tract as one of the changes testosterone brings about. If lower formant frequencies are the result of physiological changes in the vocal tract, we should find consistently find downward movement across all of the formants. Alternatively, movement in formant frequencies could also be due to shifts in articulatory habit, rather than physiology. If articulatory changes are driving formant frequencies downward, we might find more variable results; for example, perhaps not all speakers undergo a change in formants, even if they undergo a change in F0, or perhaps some speakers undergo a change in F2 but not F1, or vice versa. Additionally, certain vowels may shift more than others based on social or linguistic salience (Mendoza-Denton 2008; Eckert 2008; Woolard 2008). As I discussed in chapter 2, Papp (2011) found that 7 trans men recorded during their first year of testosterone showed decreases in F1 and F2; however, some speakers were found to have an increase in F3, while others had a decrease in that formant.

The acoustic characteristics of [s], in still further contrast, have no clear basis in any biological difference between the sexes, despite attempts to tie palate size to sex by authors like Fuchs and Toda (2010). Tongue position is the best indicator of the acoustics of [s], and speakers are physically capable of producing [s] in different ways.³⁷ As I have discussed, data from children indicates that speakers learn fairly early in life to produce [s] in gendered ways (e.g. Flipsen et al. 1999). However, it is unclear how flexible this learned behavior is later in life. If there is potential for change in this articulatory gender difference despite its early acquisition, speakers in this study are likely candidates to show such a change.

³⁶ Gorton, Buth, and Spade (2005) indicates that increases in height are possible, however, for those whose growth plates have not fused at the start of testosterone.

³⁷ Later in this chapter you will learn about Pol, a native speaker of British English and Castillian Spanish. Though Pol's /s/ in English was relatively high frequency, he produced a typically Castillian low frequency, retracted /s/ that sounds much like [ʃ] (the sound at the start of *she*, as opposed to *sea*). His [s] in Spanish was typically centered around 4,000 Hz, while his [s] in English was several thousand Hertz higher. The differences in Pol's voice across the two languages is beyond the scope of this project, but the audible difference in his productions of /s/ in the two languages supports the conclusion that his production of the sound is not constrained biologically.

For each of these acoustic variables, I conducted linear mixed regressions to determine whether there is a significant linear relationship between an acoustic variable (mean fundamental frequency, for instance) and the number of weeks that had passed since a speaker first began his testosterone regimen. This is not necessarily because testosterone is what determines the onset of phonetic changes, but because it serves as a concrete “starting point” that many of the individuals I recorded orient to as the beginning of their “official” transition process. It is much harder, for many trans people, to pin down the date at which they began their *social* (as opposed to *medical*) transitions.

I begin in section 5.2 with some basic information about the data analyzed in this chapter. I then present methods and results for each acoustic variable in its own section: fundamental frequency (section 5.3), formant frequencies (section 5.4), and [s] (section 5.5).

5.2 The data

The speakers who appear in this chapter include 15 transmasculine individuals who were in the first or, in a few cases, second year on testosterone therapy. My analysis of intra-speaker variation over time, however, focuses on 10 speakers recorded on at 8 or more occasions over the course of approximately one year (see Table 5.2). The additional five speakers appear only in the plot of center of gravity for [s], which appears at the end of this chapter as Figure 5.6 and reappears in chapter 6, to illustrate the huge range of results obtained for this variable.

Most of these speakers describe themselves as transgender men, though some self-identify as genderqueer or with some other non-normative gender label. What they have in common is that they were all making use of injectable testosterone in order to masculinize their bodies. Several speakers began at a “low dose” of 25-50 milligrams of testosterone (or “T”) every week, working up to the typical “full dose” of 100 milligrams per week (though some do biweekly injections instead). Some took a full dose from the very beginning. However, others preferred to remain at a low dose or to build up their dosage slowly. Importantly, though, a person’s dosage does not directly determine the actual testosterone levels in his the bloodstream, so one trans person may find 100mg per week gives him testosterone levels that are

considered too high while another finds that the same dose leaves him with a much lower levels (see Gorton, Buth & Spade 2005 for more on testosterone therapy for trans people). Most participants in this study reported that their providers did not check their serum testosterone levels regularly, if at all, which is unfortunate because these levels would be a better direct indicator than dosage for how much testosterone is present in an individual's endocrine system.

The data analyzed in this chapter are drawn from Fairbanks' (1960) Rainbow Passage, which appears in its entirety in Appendix A, and the tokens analyzed appear in Tables 5.2 and 5.15 below. Speakers read the Rainbow Passage, along with sets of sentences that are not included in the present analysis, at regular recordings throughout the year. Some form of interactional data was also recorded at each session, whether in the form of interviews, semi-structured conversations (Alim 2004), or everyday interactions with others in their lives. Attempts were made to record every speaker once per month, but the realities of scheduling meetings with participants meant that the time between recordings is more typically in the range of 2-6 weeks, particularly since some speakers were more consistently available for recordings than others. Recordings were made on a Fostex Field Recorder with an Audio-Technica headset microphone at a sampling rate of 44,000 Hz. Prior to acoustic analysis with Praat, the amplitude for these recording was normalized to 60db.

5.3 Fundamental frequency

5.3.1 Methods for fundamental frequency analysis

My analysis of fundamental frequency and formant frequencies is based on a set of 20 vowel tokens that appear in the Rainbow Passage. Measurements taken from this set of vowels are then compared across multiple recordings of the passage throughout each speaker's participation in this study. The tokens selected come from a central portion of the Rainbow Passage (see Appendix A), and consist of stressed vowels preceded and followed by stops, nasals, or fricatives. They include two tokens of each of the following vowels: /i/, /ɪ/, /ɛ/, /ey/, /æ/, /ʌ/, /ay/, /ow/, as well as four tokens of /ɑ/. Table 5.1 contains the words and sentential contexts of the vowels analyzed.

Table 5.1: Vowels measured for F0-F3 analysis

<u>Vowel</u>	<u>Word</u>	<u>Context</u>
/ey/	<i>take</i>	These take the shape of a long round arch, with its path high above and its two ends apparently beyond the horizon.
/ey/	<i>shape</i>	
/æ/	<i>path</i>	
/ʌ/	<i>above</i>	
/ɑ/	<i>pot</i>	There is, according to legend, a boiling pot of gold at one end.
/i/	<i>people</i>	People look, but no one ever finds it.
/ɑ/	<i>pot</i>	When a man looks for something beyond his reach, his friends say he's looking for the pot of gold at the end of the rainbow.
/ɛ/	<i>accepted</i>	Some have accepted it as a miracle without physical explanation.
/ɪ/	<i>physical</i>	
/i/	<i>Hebrews</i>	To the Hebrews, it was a token that there would be no more universal floods.
/ow/	<i>token</i>	
/ow/	<i>no</i>	
/ay/	<i>sign</i>	The Greeks used to imagine that it was a sign from the gods to foretell war or heavy rain.
/ɑ/	<i>gods</i>	
/ɛ/	<i>heavy</i>	
/ɑ/	<i>gods</i>	The Norsemen considered the rainbow as a bridge over which the gods passed from Earth their home in the sky.
/æ/	<i>passed</i>	
/ay/	<i>sky</i>	
/ʌ/	<i>others</i>	Others have tried to explain the phenomenon physically.
/ɪ/	<i>physically</i>	

Once these vowels were identified and segmented in each recording, a Praat script was used to determine the maximum, minimum, and mean F0 appearing within each vowel token, though I report only on means because the statistical results for maximum and minimum F0 were always consistent with mean F0 (with the exception of James; see the discussion of his F0 changes below). Each measurement point was then checked in order to verify the values collected by Praat and calculate F0 manually where needed. The dataset thus includes measurements for 20 tokens per recording, per speaker. There are between 8 and 13 recordings of the Rainbow Passage available for each of the 10 speakers analyzed on a longitudinal basis. Table 5.2 has the total number of recordings and vowel tokens analyzed for these speakers, along with brief demographic information for each individual. Details about my participants' identities is a focus of chapter 6, in which I explore distinctions like *trans man* versus *trans boy*, but for now these details provide a bit of grounding context for the results described below.

Table 5.2: Demographic information and number of tokens for all speakers included in vowel analysis

<u>Speaker</u>	<u>Demographics</u>	<u>Total # of recordings</u>	<u>Total # of vowel tokens</u>
Adam	38, white, queer trans man, upper middle-class family, community program director, from NYC suburbs	12	240
Pol	Queer genderqueer trans boy, 23, white, working class family, student, from Spain (UK English)	8	160
Tony	Queer trans man, 28, white, queer trans man, middle-class family, tech support worker, from the Bay Area	10	200
Elvis	Queer genderqueer/transgender person, 23, white/Jewish, middle-class family, house sitter / barterer, Bay Area	9	180
Devin	Queer genderqueer/transmasculine person, 24, white, middle class family, environmental educator, Bay Area	13	260
Carl	Straight – but also queer – trans man, 22, Filipino, middle class family, recent college grad, Bay Area	9	180
Kyle	Queer trans man, 24, white, working class family, environmental educator, Bay Area	13	260
James	Queer genderqueer trans boy 26, white, upper class family, graduate student, Massachusetts	8	200
Mack	Straight trans man, 46, white, middle class family, bus driver, Bay Area (with ties to South Carolina)	11	220
Dave	Queer trans man, 23, white, upper-middle class family, unemployed artist, Bay Area	11	220

One important note is that the measurements taken of fundamental frequency include vowels that display creaky voice quality. As I explained in chapter 2, creaky voice occurs when the vocal folds are slack and vibrate at a very low frequency. As a result, even speakers with high pitched voices can produce a very low fundamental frequency (well below 100 Hz) when creaky voice quality is employed. Some of these speakers – such as James, about whom you will hear more in a moment – make ample use of creaky voice, which gives them a greater number of tokens with relatively low F₀, compared to what we might hear if only modal (non-creaky) phonation was used. In fact, James’ use of creak is so extensive in some recordings that he would have only a few measurable tokens if only modal voice were considered. The relationship between pitch and voice quality is unclear in that we do not know if speech produced with creaky voice quality with a mean of 100 Hz is perceived the same way (i.e. as equally low pitched) as speech produced with a similar F₀ range but with modal voice quality. Are speakers like James perceived

as having lower-pitched voices than they would be if they used only modal voice quality? In future analyses, incorporating voice quality measures would allow for more nuanced exploration of the relationship between creak and pitch; for the time being, I analyze raw fundamental frequency, regardless of voice quality.

In order to analyze the statistical significance of the acoustic changes reflected in these data, I used a series of mixed effects linear regressions. Linear regressions allow us to ask whether a linear variable, like fundamental frequency, can be explained by some other variable, like the amount of time an individual has been on testosterone. Mixed effects regressions include two types of variables, both of which help to explain the variance of F0 measurements within the data. First, *fixed effects variables* are explanatory variables that are hypothesized to be meaningfully patterned rather than random. In this analysis I expect that amount of time on testosterone predicts a significant amount of a speaker's variance of F0 in a consistent way, such that the same word, in the same context, will be produced with a lower F0 as these speakers' length of time on testosterone increases. The variance accounted for by this variable follows a consistent pattern and is non-random; its effects are "fixed." Mixed effects models also incorporate *random effects variables*, which contribute to the variance in the dataset despite not following a consistent linear pattern the way fixed effects do. In this case, we know that fundamental frequency will be different depending on the word in which it appears, but these differences are not of interest to the present analysis, nor can they be accounted for by any single (fixed) effect. For these reasons, the word a measurement comes from is treated as a random effect for these analyses. By accounting for the influence of random effects variables like *word*, we get a clearer picture of what portion of the remaining variance is accounted for by the fixed effect variables. For my analysis of F0, I first constructed a mixed effects model that treats *mean F0* as the dependent variable, *weeks on testosterone* as a fixed effects variable, and *word* and *speaker* as random effects variables. However, I also wanted to investigate whether and how individual speakers' F0 changed during the period of time I was recording them, which lead me to construct separate mixed effects models for each speaker that treat *mean F0* as the dependent variable, *weeks on testosterone* as a fixed effects variable, and *word* as a random effects variable. Because I expect

that a variety of factors will influence the way F0 changes, I want to allow for the possibility that different speakers will experience different patterns of change. Performing multiple comparisons in this way increases the risk of a false positive result, however, so α ³⁸ was adjusted to 0.005.

5.3.2 Results of fundamental frequency analysis

I began by analyzing the relationship between F0 and weeks on testosterone among all 10 speakers in the longitudinal sample. This analysis revealed a highly significant negative relationship between mean F0 and weeks on testosterone ($B = -0.5097, p < 0.001$), indicating that a greater number of weeks on testosterone correlates with a lower F0.

Table 5.3 contains the mean F0 for each speaker's first and last recordings along with how long they had been on testosterone (or "T") at that time. Also included are coefficients from the linear mixed effects regressions conducted across the speaker's entire dataset (i.e. not only the first and last recordings, which are included here only for reference). These coefficients indicate the direction of the correlation as well as the size of the effect. A positive coefficient indicates a positive correlation between F0 and time on testosterone (i.e. higher F0 over time), while a negative one indicates the opposite (i.e. lower F0 over time). A small coefficient suggests a weaker predictive relationship between F0 and time on testosterone, while a large coefficient indicates a stronger effect – that is, a larger coefficient indicates that larger changes are happening in F0 over time.³⁹ p values from each regression analyses are provided as a measure of the statistical significance of the overall downward trend across the speakers' recordings. As

³⁸ α sets the largest acceptable probability that the null hypothesis (i.e. that there is no relationship between F0 and weeks on testosterone, in this case) is correct. Typically, α is set at 0.05 for single comparisons in the social sciences, meaning that p values smaller than 0.05 indicate that the null hypothesis can be rejected. Because 10 comparisons were made, the α level was set at $0.05 / 10 = 0.005$.

³⁹ Note, however, that a smaller coefficient does not mean an overall smaller change in F0, as the range of time spanned by these speakers differs somewhat. For instance, Elvis shows a large and highly significant change in F0, but has a smaller coefficient than many other speakers because those changes were observed over a longer period of time (68 weeks instead of the typical one year period, because Elvis moved away from the Bay Area but later returned and was available to record again when he had been on testosterone for 71 weeks).

an additional point of reference, delta values are also provided; these reflect the mean rate of change in Hz per week, based on the starting and ending points listed in the table. Speakers are ordered in this table according to the amount of time they had been on testosterone when they were first recorded.

As Table 5.3 indicates, 8 of these 10 speakers had a highly significant downward shift in fundamental frequency during their participation in this study. The only two speakers who did not show a significant and consistent downward shift over time were James and Dave, whose mean F0 at the time of their first recording was already at 123 Hz and 126 Hz, respectively. These starting values are within the F0 ranges reported for American English-speaking men's voices, which are said to average in the range of 100-120 Hz. Because both of these speakers report having female-sounding voices before beginning testosterone (in fact, Dave describes himself as having a "very high soprano" speaking voice), it is reasonable to assume that they had a significant drop in F0 that happened before I began recording them. Another possibility in the case of James is that his frequent use of creaky voice masked any changes happening in his modal F0.

Though the pattern of downward change is consistent across speakers, there are clear differences in the rate at which the changes occurred. This is particularly apparent when considering the speakers toward the bottom of Table 5.3, who were further along in their hormonal transitions. For example, James had been on testosterone for 25 weeks when I began recording him, but his voice had already dropped to an average F0 of 123 Hz. Elvis, similarly, was already at 142 Hz after only three weeks on testosterone. Mack, on the other hand, had been on testosterone for 46 weeks when I began recording him, but his final F0 of 197 Hz was still higher than any other speaker's starting F0. His voice was still changing during his second year on testosterone and during that time his mean F0 dropped from 220 Hz to 197 Hz.

The raw amount of acoustic change that occurs during the first year or two on testosterone is also variable. The starkest comparison on this front is between Devin and Carl. Devin's mean F0 dropped from 172 Hz at 2 months on testosterone to 113 Hz a year later (a difference of 59 Hz). Carl, on the other hand, had the smallest drop in F0 (6 Hz), from 164 Hz at 10 weeks on testosterone to 158 Hz at 61 weeks

– however, the overall downward trend in Carl’s F0 was statistically significant. My analysis of individual speakers’ trajectories sheds greater light on these differences.

Table 5.3: Overview of changes in F0

<u>Speaker</u>	<u>F0 at first recording</u>	<u>F0 at last recording</u>	<u>Delta</u>	<u>Regression coefficient</u>	<u>Regression p value</u>
Adam	169 Hz (0 weeks)	126 Hz (47 weeks)	-0.91	B = -0.7065	$p < 0.001$ *
Pol	177 Hz (0 weeks)	132 Hz (42 weeks)	-1.07	B = -1.377	$p < 0.001$ *
Tony	167 Hz (0 weeks)	122 Hz (47 weeks)	-0.96	B = -1.15	$p < 0.001$ *
Elvis	142 Hz (3 weeks)	124 Hz (71 weeks)	-0.26	B = -0.2754	$p < 0.001$ *
Devin	172 Hz (8 weeks)	114 Hz (65 weeks)	-1.02	B = -0.9985	$p < 0.001$ *
Carl	164 Hz (10 weeks)	158 Hz (61 weeks)	-0.12	B = -0.2266	$p < 0.003$ *
Kyle	149 Hz (13 weeks)	110 Hz (72 weeks)	-0.66	B = -0.5115	$p < 0.001$ *
James	123 Hz (25 weeks)	113 Hz (87 weeks)	-0.16	B = -0.0731	$p < 0.354$
Mack	220 Hz (46 weeks)	197 Hz (102 weeks)	-0.41	B = -0.3607	$p < 0.001$ *
Dave	126 Hz (65 weeks)	113 Hz (113 weeks)	-0.27	B = 0.0511	$p < 0.39$

To expand on the overview in Table 5.3, Tables 5.4 through 5.13 provide more details about individual speakers’ changes in F0 by providing the mean F0 for each recording. Next to every table is a box plot that illustrates the speaker’s change over time visually. The plots show the distribution of F0 values over the 4 central deviations (i.e. without outliers), with a dark line at the statistical mean.

Beginning with the speakers whom I first recorded before they began taking hormones, Table 5.4 shows Adam’s fundamental frequency throughout the 11 recordings I made of him reading the Rainbow

Passage. Adam is a 38 year old white, queer-identified trans man who grew up in an upper middle class Italian and Irish Catholic family in New York City's northern suburbs. He works in as a program director for a Bay Area community service organization's program for LGBT youth. Adam began testosterone at a typical full dose of 100mg per week, which he maintained throughout the length of the project.

I began recording Adam shortly before he began testosterone and ending when he had been on testosterone for 47 weeks. Over this time, he had a significant drop in F0 ($B = -0.7065$; $p < 0.001$).

Adam, like several other speakers in this set, started out with a fairly low F0, relative to the numbers often reported for women (averaging at 200-220 Hz). By the end of the first year of his transition, Adam's F0 is within the range typically reported for male speakers.

Table 5.4: Mean fundamental frequency for Adam over time

Recording	Weeks on T	Weekly T dose	Mean F0
1	0	50mg	169 Hz
2	2	50mg	158 Hz
3	5	50mg	155 Hz
4	8	50mg	155 Hz
5	11	50mg	143 Hz
6	16	50mg	156 Hz
7	22	50mg	147 Hz
8	29	50mg	142 Hz
9	33	50mg	134 Hz
10	41	50mg	137 Hz
11	47	50mg	126 Hz

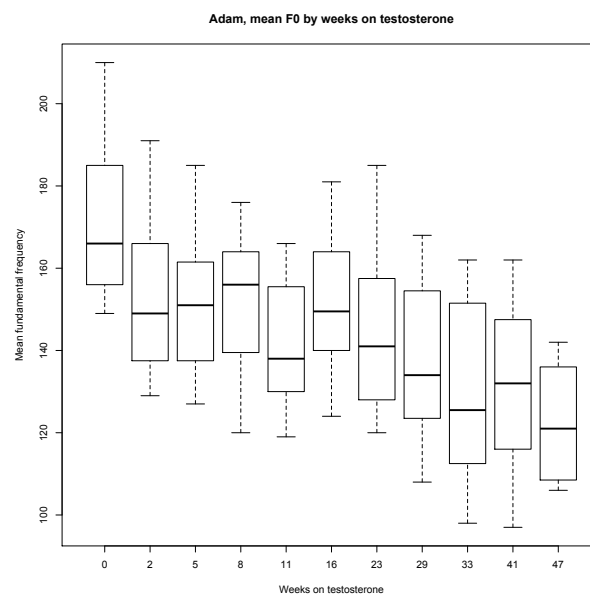
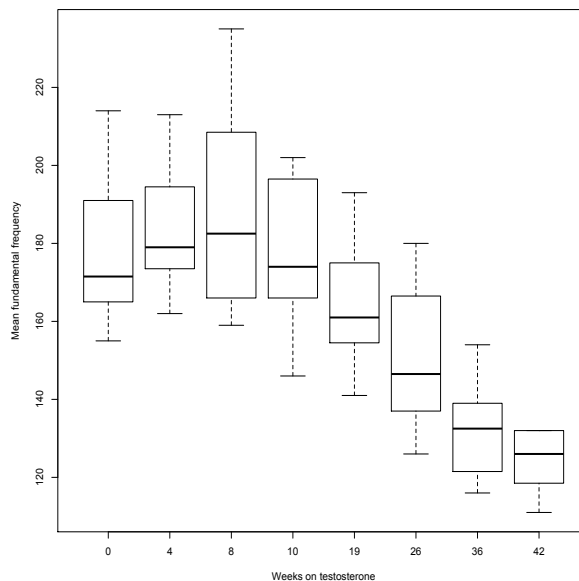


Table 5.5 provides F0 means for Pol across 8 recordings of the Rainbow Passage. Pol is a 23 year old white, queer transmasculine student at a Bay Area university who describes himself as a *trans boy* and not a *trans man* (more on these nuances in chapter 6). He grew up in Spain, with a Spanish father and

British mother, and is a native bilingual speaker of British English and Castilian Spanish. During the time I recorded him, however, his accent became increasingly Americanized (for example, words like *path* went from being pronounced with [a] to often being pronounced with a vowel closer to the typical American [æ]). Pol was interested in proceeding slowly with his hormonal transition, leading him to maintain a low dose of testosterone, 50mg every two weeks, throughout. However, Table 5.5 lists his dose as 25mg per week for ease of comparison with other tables.⁴⁰ Like Adam, Pol had a highly significant downward shift in F0 during his first year on testosterone ($B = -1.377$; $p < 0.001$), with starting and ending mean F0 slightly higher than Adam's.

Table 5.5: Mean fundamental frequency for Pol over time

<u>Recording</u>	<u>Weeks</u> <u>on T</u>	<u>Weekly T</u> <u>dose</u>	<u>Mean F0</u>
1	0	25mg	177 Hz
2	2	25mg	185 Hz
3	8	25mg	186 Hz
4	10	25mg	178 Hz
5	19	25mg	166 Hz
6	26	25mg	152 Hz
7	36	25mg	135 Hz
8	42	25mg	132 Hz



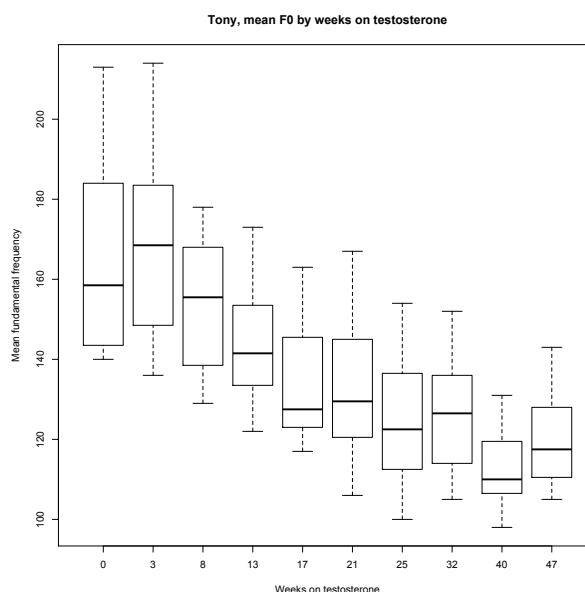
Next, Table 5.6 has Tony's F0 means across 10 recordings. Tony is a 28 year old white, queer-identified trans man who grew up in San Francisco's eastern suburbs. He describes his family as middle

⁴⁰ Testosterone levels peak shortly after a dose is injected and then lower over the course of the week or two week cycle. Some trans people on testosterone experience side effects, like mood swings, associated with the "trough" period at the end of the cycle. For that reason, many people choose to inject on a weekly rather than biweekly schedule.

class, and currently works in a technical support position for an online gaming company. Tony began at a low dose of testosterone at 50mg every two weeks, eventually working up to the full dose of 200mg every two weeks. With beginning and ending means close to Adam's, Tony, too, had a highly significant change in F0 during his first year on testosterone ($B = -1.15$; $p < 0.001$).

Table 5.6: Mean fundamental frequency for Tony over time

<u>Recording</u>	<u>Weeks on T</u>	<u>Weekly T dose</u>	<u>Mean F0</u>
1	0	25mg	167 Hz
2	3	25mg	170 Hz
3	8	25mg	157 Hz
4	13	50mg	146 Hz
5	17	50mg	135 Hz
6	21	50mg	135 Hz
7	25	50mg	126 Hz
8	32	100mg	129 Hz
9	40	100mg	114 Hz
10	47	100mg	122 Hz



Fundamental frequency means for 9 recordings made with Elvis can be seen in Table 5.7. Elvis is a 23 year old Bay Area native who identifies as queer and masculine, but has an uneasy relationship with gender categorization labels like (*trans*) *man* and *genderqueer*.⁴¹ He describes his ethnicity as white and Jewish, and says he comes from a middle class family. Currently, Elvis currently makes ends meet through house- and pet-sitting and other forms of service exchange and bartering. He started testosterone at a very low dose of 35mg every 10 days, working his way up 5-10mg at a time every month or two (though again, the dosage values in Table 5.7 are represented in terms of a weekly scale). I began recording Elvis when he had been on testosterone for only three weeks, but he reported that his voice had

⁴¹ I.e. individuals who do not identify as strictly male or female. See chapter 6.

already changed during that short window of time, which seems likely given both his rather low starting F0 of 142 Hz and the way his voice sounded at our first meeting. Despite missing this initial portion of his vocal change, Elvis' F0 did lower significantly between his 3rd and 71st week on testosterone ($B = -0.2754$; $p < 0.001$).

Table 5.7: Mean fundamental frequency for Elvis over time

<u>Recording</u>	<u>Weeks</u> <u>on T</u>	<u>Weekly T</u> <u>dose</u>	<u>Mean F0</u>
1	3	25mg	142 Hz
2	6	25mg	130 Hz
3	8	25mg	143 Hz
4	12	32mg	145 Hz
5	14	35mg	138 Hz
6	18	35mg	121 Hz
7	22	42mg	122 Hz
8	28	49mg	121 Hz
9	71	60mg	123 Hz

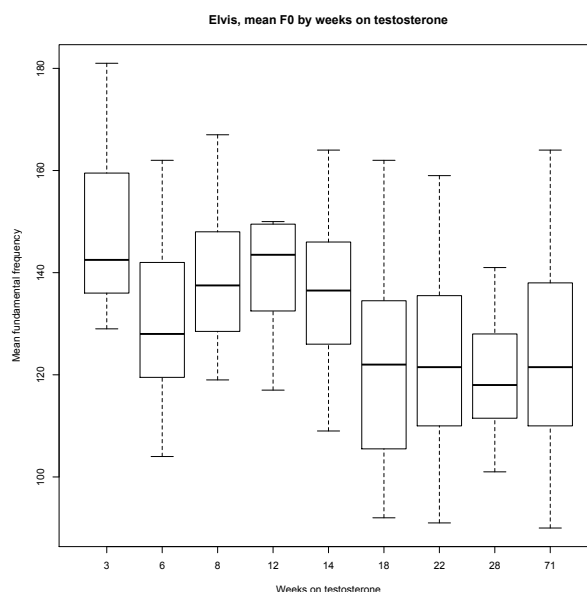
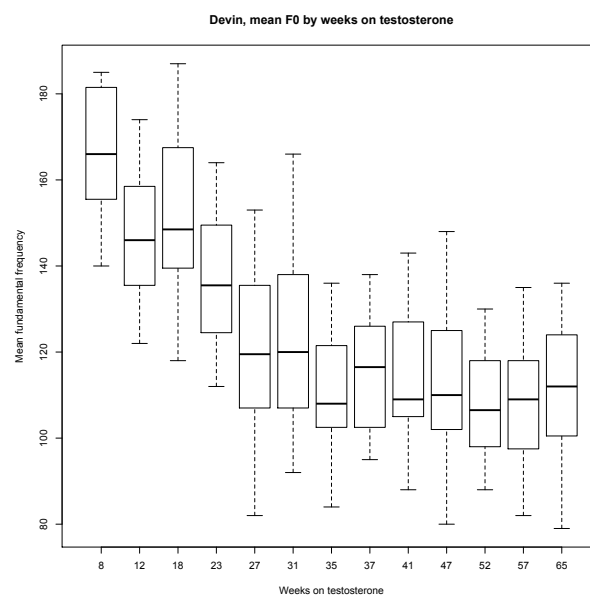


Table 5.8 shows the changes in Devin's fundamental frequency through 13 recordings of the Rainbow Passage. Devin is a 24 year old white, queer transmasculine person who describes himself in certain contexts as both transgender and genderqueer, but who also prefers to avoid identity labels whenever possible. He is college educated and, like many other speakers discussed here, grew up in a middle class family in the east Bay Area. Currently, he works as a teacher for an environmental education group that caters to elementary and middle school-aged students. As I mentioned above, Devin had the biggest drop in F0 from first to final recording, which was matched by the startling salience of his vocal changes ($B = -0.9985$; $p < 0.001$). He had already been on hormones for 2 months when I began

recording him, and reported that his voice had already lowered noticeably. His testosterone dose at that time was 200mg every two weeks. He began at this full dose, and ended up lowering his dose because his doctor found that his testosterone levels were too high at a full dose. At his final dose of 120mg every 2 weeks, he maintained testosterone levels within the typical range for men. It seems likely that Devin's high testosterone levels are related to the dramatic degree to which his voice changed.

Table 5.8: Mean fundamental frequency for Devin over time

<u>Recording</u>	<u>Weeks</u> <u>on T</u>	<u>Weekly T</u> <u>dose</u>	<u>Mean F0</u>
1	8	100mg	172 Hz
2	12	100mg	148 Hz
3	18	100mg	153 Hz
4	23	100mg	138 Hz
5	27	90mg	123 Hz
6	31	90mg	120 Hz
7	35	90mg	113 Hz
8	37	90mg	117 Hz
9	41	90mg	113 Hz
10	47	90mg	116 Hz
11	52	90mg	106 Hz
12	57	80mg	108 Hz
13	65	60mg	114 Hz

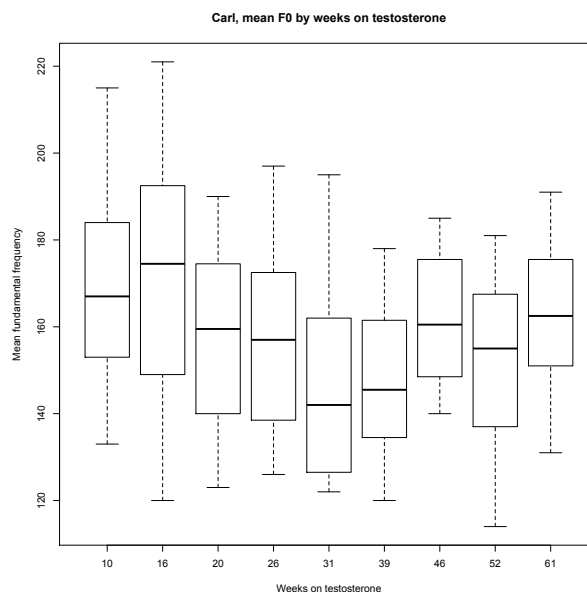


Carl's changes in fundamental frequency across 9 recordings can be seen in Table 5.9. Carl is a 22 year old queer Filipino trans man who was raised in the eastern part of the Bay Area in a middle class immigrant family. He graduated from a well regarded local university during the course of the study, and was living at home and looking for work when we concluded our recordings. Although his change in F0 was statistically significant ($B = -0.2266$; $p < 0.003$), Carl had the smallest numeric change from first to final recording, though Table 5.9 and its accompanying boxplot show that his mean F0 was as low as 141 Hz when he had been on testosterone for 31 weeks. After this low point, his F0 shifts back upward to the

153-160 Hz range, following a pattern similar to the “reverse J” trajectory identified by Papp (2011), in which speakers’ F0 reached an initial low before returning to a slightly higher resting point. Carl began testosterone at a dose of 50mg per week, and moved up to 150mg every two weeks by the time I started recording him. He maintained this dose throughout the study.

Table 5.9: Mean fundamental frequency for Carl over time

<u>Recording</u>	<u>Weeks on T</u>	<u>Weekly T dose</u>	<u>Mean F0</u>
1	10	75mg	164 Hz
2	16	75mg	175 Hz
3	20	75mg	159 Hz
4	26	75mg	159 Hz
5	31	75mg	141 Hz
6	39	75mg	148 Hz
7	46	75mg	160 Hz
8	52	75mg	153 Hz
9	61	75mg	158 Hz



The next table displays Kyle’s mean F0 across 13 recordings. Kyle is a 24 year old white, queer trans man who, when I met him, was in the process of moving away from a more genderqueer transmasculine identity and toward self-identifying as a trans man. He, too, grew up in the east Bay Area and works for an environmental organization in a educator role very similar to Devin’s. Kyle had been on testosterone for 13 weeks when I first recorded him, and at that point his mean F0 was already at 149 Hz. He began at a full dose of 100mg per week, which he maintained, though he switched from biweekly to weekly injections shortly before I met him. From the 13 week mark to the 72 week mark, his F0 dropped significantly ($p < 0.001$), ending at a mean of 110 Hz.

Table 5.10: Mean fundamental frequency for Kyle over time

Recording	Weeks on T	Weekly T dose	Mean F0
1	13	100mg	149 Hz
2	16	100mg	136 Hz
3	19	100mg	158 Hz
4	23	100mg	138 Hz
5	29	100mg	147 Hz
6	32	100mg	122 Hz
7	38	100mg	137 Hz
8	41	100mg	125 Hz
9	47	100mg	128 Hz
10	49	100mg	129 Hz
11	58	100mg	132 Hz
12	58	100mg	130 Hz
13	72	100mg	110 Hz

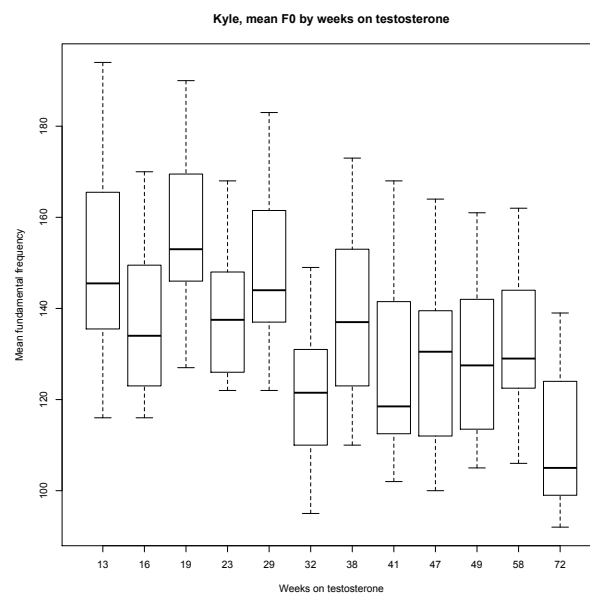


Table 5.11 has means for James' fundamental frequency across 8 recordings. James is a 26 year old, white, queer transmasculine person who comes from what he calls a class-privileged family in eastern Massachusetts. He is currently studying to become a social worker, motivated in large part by his commitment to politics he characterizes as radically-minded and social justice-oriented. His starting testosterone dose was 50mg per week, which he shifted down to 40mg per week shortly before our first recording, and later returned to 50mg per week. As I mentioned above, James was one of only two speakers who did not undergo a significant downward shift in F0. This is partly, no doubt, attributable to the fact that he had been on testosterone for just over 5 months when I first recorded him. Additionally, James' use of creaky voice quality contributes toward the many low frequency tokens present in his earliest recordings.

Although I analyzed minimum, maximum, and mean F0 for all speakers, I report the results for maximum F0 only from James because he is the only speaker whose maximum or minimum F0 results

differed in any way from the results for his mean F0 analysis. Even though James' mean F0 did not trend downward in a statistically significant way, a downward shift in maximum F0 suggests that the upper limit of James' fundamental frequency may have been decreasing ($B = -0.1657$, $p = 0.0533$). But note that "maximum F0" and "minimum F0" here refers to the maximum and minimum F0 points within a single vowel. These values thus reflect the F0 range covered within individual vowels, not the maximum and minimum F0 points for the entire recording (pitch range, of course, is an interesting issue for future investigation of these data, as Papp's dissertation indicates). Table 5.12 reflects James' change in maximum F0.

Table 5.11: Mean fundamental frequency for James over time

<u>Recording</u>	<u>Weeks</u> <u>on T</u>	<u>Weekly T</u> <u>dose</u>	<u>Mean F0</u>
1	25	40mg	123 Hz
2	29	40mg	117 Hz
3	33	40mg	122 Hz
4	39	40mg	113 Hz
5	44	50mg	115 Hz
6	49	50mg	117 Hz
7	52	50mg	120 Hz
8	87	50mg	113 Hz

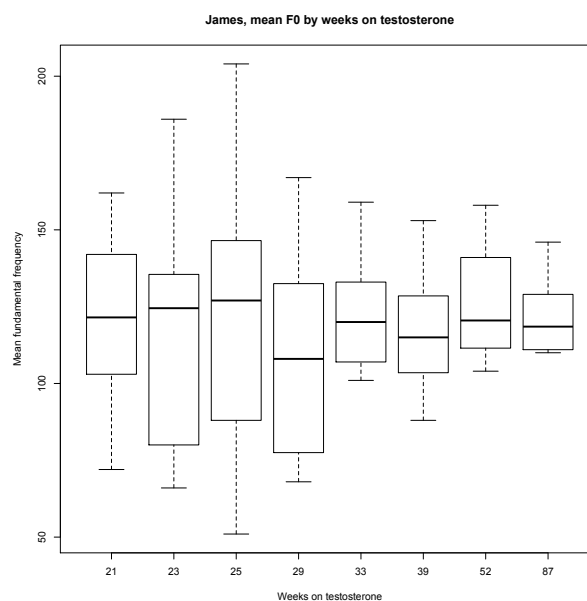
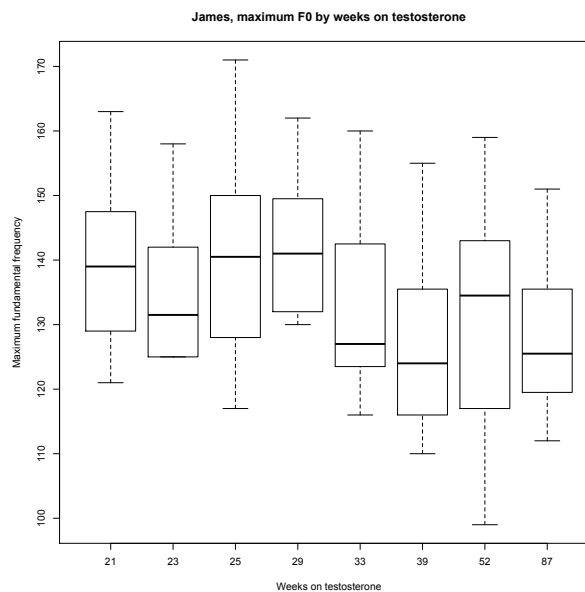


Table 5.12: Mean fundamental frequency for James over time

<u>Recording</u>	<u>Weeks on T</u>	<u>Weekly T dose</u>	<u>Maximum F0</u>
1	25	40mg	136 Hz
2	29	40mg	127 Hz
3	33	40mg	140 Hz
4	39	40mg	143 Hz
5	44	50mg	126 Hz
6	49	50mg	128 Hz
7	52	50mg	131 Hz
8	87	50mg	124 Hz



F0 means for Mack, based on 11 recordings of the Rainbow Passage, appear in Table 5.13. Mack is a 46 year old, white, straight trans man who was born in South Carolina but spent his childhood in the Bay Area. As he works to put his son through college, Mack is employed as a driver for a private charter bus service. After spending several decades identifying as a lesbian, he now describes himself as “just a regular straight guy”. As I mentioned, Mack had the highest F0 of any speaker in my study, though it did show a significant decline from 220 Hz to 197 Hz between his first and last recording ($B = -0.3607$; $p < 0.001$). He described himself as having had a very high pitched voice prior to transition, and at times has been frustrated that the vocal (and other) changes brought about by testosterone have not happened more quickly for him. Echoing commonly cited wisdom within the community, Mack believes that he would have seen faster and more dramatic masculinization if he had begun his transition at an earlier age. At the same time, he reports having intentionally pursued a slow transition process – including staying at a “half” dose of 100mg every two weeks for the first 9 months of his transition, and moving up slowly from there – in large part to make the process easier on his son. I return to these issues in chapter 6.

Table 5.13: Mean fundamental frequency for Mack over time

Recording	Weeks on T	Weekly T dose	Mean F0
1	46	60mg	220 Hz
2	49	60mg	204 Hz
3	53	60mg	201 Hz
4	60	60mg	198 Hz
5	65	60mg	192 Hz
6	70	60mg	189 Hz
7	74	60mg	168 Hz
8	78	60mg	187 Hz
9	83	84mg	194 Hz
10	93	84mg	188 Hz
11	102	84mg	197 Hz

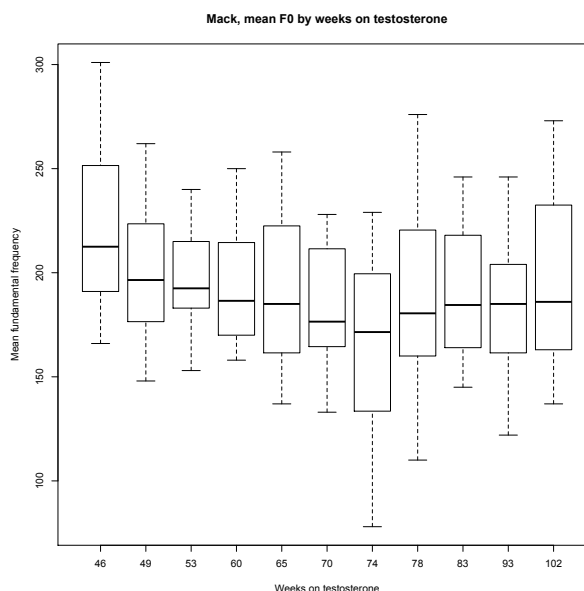
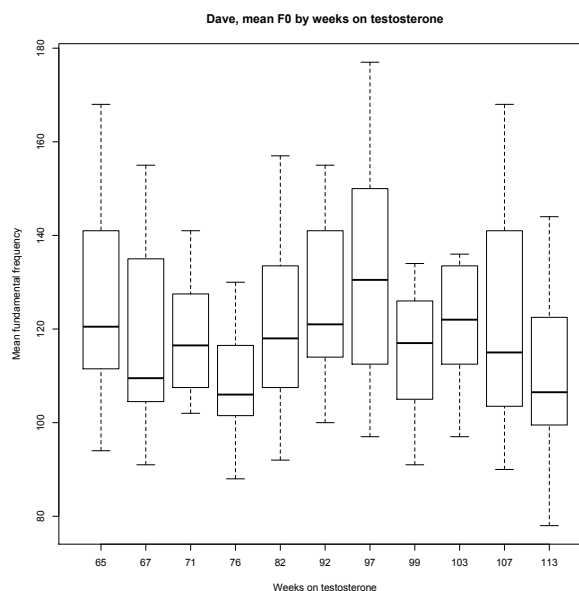


Table 5.14 provides means for Dave’s fundamental frequency in 11 recordings. Dave is another Bay Area-born 23 year old queer trans man from a middle-class family who also describes himself as *fem*. Following his time in college and a foray into graduate school for a degree in art, which he practices avidly in his free time, Dave dealt with unemployment through much of his participation in this study. Like James, Dave had no statistically significant change in F0 across the recordings we made. He had been on testosterone for over a year when I first recorded him, at which point his fundamental frequency may have stopped changing. When he started testosterone he was at a dose of 50mg per week, he worked up to 100mg per week before lowering his dose back to 90mg per week because he hoped to slow or prevent hair loss.⁴²

⁴² Actually, Dave was contemplating stopping testosterone all together, because he had mixed feelings about some of the potential effects (like hair loss) and felt that he had attained the degree of masculinization he desired. He thus planned to gradually lower his dose over time, and anticipated being off of testosterone all together by the time he finished participation in this study, but he ended up feeling more resistant to that process than he anticipated. At our final recording, he maintained a dose only slightly below his previous full dose.

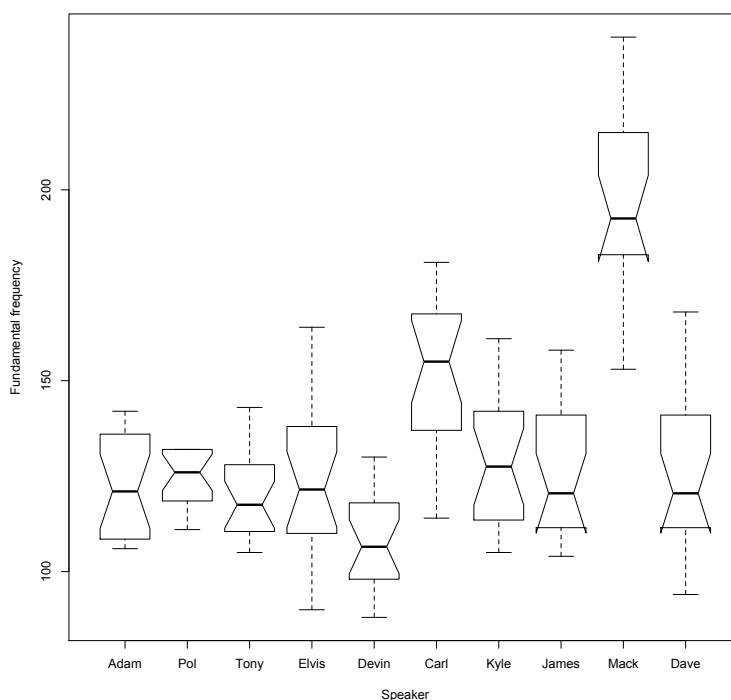
Table 5.14: Mean fundamental frequency for Dave over time

Recording	Weeks on T	Weekly T dose	Mean F0
1	65	100mg	126 Hz
2	67	100mg	118 Hz
3	71	100mg	120 Hz
4	76	100mg	111 Hz
5	82	100mg	122 Hz
6	92	100mg	130 Hz
7	97	90mg	136 Hz
8	99	90mg	121 Hz
9	103	90mg	127 Hz
10	107	90mg	122 Hz
11	113	90mg	113 Hz



Finally, Figure 5.1 shows the F0 for all 10 speakers. For each speaker, I have selected the recording that comes closest to the date marking one year of testosterone therapy. Using the plotting function in R (R Development Core Team 2011), notches have been added to this box plot near the mean F0 of each speaker. Following (Chambers et al. 1983), these notches indicate which speakers' F0 values are significantly different from one another. If the notches overlap – as is the case for Kyle and James, for example – there is no significant differences between the two speakers. If the notches do not overlap – as is the case for Kyle and Carl – the two speakers' values for F0 are significantly different.

Figure 5.1: Mean fundamental frequency for all 10 speakers at approximately 1 year on testosterone



5.3.3 Summary of fundamental frequency findings

The process of transitioning with the aid of masculinizing hormone therapy has apparently had a significant, and in some cases quite profound, effect on all of these speakers' fundamental frequencies. The three participants who I began recording before their first injections of testosterone started with relatively low pitched voices for members of their assigned sex, though this was clearly not the case for everyone (e.g. Mack, but also Devin and Dave based on their descriptions of their old voices). Despite this fact, all reported that their voices were universally perceived as female based on their voices prior to testosterone. Some continued to be perceived as female on the phone – such as Mack, whose voice remained relatively high pitched, and Pol, despite his relatively low F0. Most, however, told me by the end of a year of recording that they were usually perceived as men, at least in face-to-face interactions. Of course, perceptual studies are needed to further investigate the question of whether and when their voices

begin being perceived as male voices. From an acoustic perspective, however, 7 out of the 10 speakers ended with an F0 in the range of 113 to 126 Hz (Adam, Tony, Elvis, Devin, Kyle, James, and Dave). Figure 5.1 shows that most speakers were at a comparable range when they reached one year of testosterone therapy, though both Carl and Mack had significantly higher F0 than the other speakers and Devin had a lower F0 than most.

There is a good deal of variety in the degree of change speakers experienced, as well as the trajectory and timeline on which those changes occurred. Some speakers, like James and Elvis, achieved a low mean F0 very shortly after starting a hormonal regimen, while others' voices lowered more slowly and over a longer period of time. The three individuals I began recording before they began testosterone – Adam, Pol, and Tony – had consistent, linear downward movement in F0 that continued throughout the full year that is clearly visible in their boxplots. Other speakers, however, had more uneven changes: Elvis' downward movement stopped at around 4.5 months on testosterone, Devin's trailed off after 7 months, and Kyle had changes through 10 months, then had another drop off between 14 and 18 months on hormones. Mack's changes were much more gradual and continued through his second year on testosterone. Several factors could be relevant here, including speakers' testosterone dose, starting and ending F0, and a number of social factors that I explore in-depth in chapter 6.

5.4 Formant frequencies

5.4.1 Methods for formant frequency analysis

The analysis of vowel formants I present in this section uses the same set 20 vowel tokens described in section 5.3 (see Table 5.1). With the same Praat script mentioned above, formant values for the first three formants (F1, F2, and F3) were collected at the midpoint for monophthongs and at the 25% and 75% marks in diphthongs. Adjustments to the measurement points were made as needed in order to capture the steady state of the vowel (i.e. the portion of the vowel where formants are relatively stable and representative of that vowel's quality), and each measurement produced by the script was checked against the spectrogram.

I began by analyzing the general trend across all speakers with a mixed-effects linear regression that treated formant frequency as the dependent variable. The fixed effects variables were weeks on testosterone, formant number (i.e. F1, F2, or F3), and the interaction between them, the latter of which tells about patterns that appeared for each formant individually. The random effects variables were word and speaker. In order to compare acoustic results on a by-speaker basis, I also constructed separate models for each individual of the same type, but without speaker as a random variable. α was again set at 0.005 for the multiple comparisons by speaker.

5.4.2 *Results of formant frequency analysis*

With all speakers considered together, there was a significant negative relationship between formant frequency and weeks on testosterone ($B = -0.5209$, $p < 0.005$), suggesting a downward trend over time among these speakers. There was also a significant interaction between weeks on testosterone and formant number that indicated a significant downward shift in F1 ($B = -0.6785$, $p < 0.005$), no change in F2, and a significant upward movement in F3 ($B = 0.9520$, $p < 0.001$).

Like in Table 5.3, Table 5.15 below provides a summary of changes for each speaker in F1, F2, and F3. For reference, I have again included the mean values for these formants at the first and final recording made of each speaker, along with delta values indicating change per week in Hertz, as well as coefficients and p values from each speaker's regression that reflect the relationship between time on testosterone on formant frequency. The p values indicate that none of these speakers had a significant change in formant frequency during the course of their recordings, nor did interactions between formant number and time on testosterone reach significance. The only speakers who approach such a pattern are Adam, Devin, and James, but none had p values that satisfied the adjusted α of 0.005.

Table 5.15: Overview of changes in formant frequencies

<u>Speaker</u>		<u>F1</u>	<u>F2</u>	<u>F3</u>	<u>Coefficient & p value</u>
Adam	<i>Start</i> (0 weeks)	587 Hz	1657 Hz	2649 Hz	B = -0.9555 p = 0.067
	<i>End</i> (47 weeks)	563 Hz	1646 Hz	2608 Hz	
	<i>Delta</i>	-0.51	-0.23	-0.87	
Pol	<i>Start</i> (0 weeks)	621 Hz	1669 Hz	2941 Hz	B = -1.152 p = 0.1804
	<i>End</i> (42 weeks)	598 Hz	1689 Hz	2749 Hz	
	<i>Delta</i>	-0.55	0.48	-4.57	
Tony	<i>Start</i> (0 weeks)	606 Hz	1709 Hz	2614 Hz	B = -0.6657 p = 0.3507
	<i>End</i> (47 weeks)	623 Hz	1675 Hz	2608 Hz	
	<i>Delta</i>	0.36	-0.72	-0.13	
Elvis	<i>Start</i> (3 weeks)	616 Hz	1730 Hz	2519 Hz	B = -0.4877 p = 0.3413
	<i>End</i> (71 weeks)	613 Hz	1625 Hz	2664 Hz	
	<i>Delta</i>	-0.04	-1.54	2.13	
Devin	<i>Start</i> (8 weeks)	627 Hz	1730 Hz	2591 Hz	B = -1.142 p = 0.0268
	<i>End</i> (65 weeks)	600 Hz	1673 Hz	2486 Hz	
	<i>Delta</i>	-0.47	-1.0	-2.84	
Carl	<i>Start</i> (10 weeks)	609 Hz	1846 Hz	2739 Hz	B = 0.4803 p = 0.4942
	<i>End</i> (61 weeks)	658 Hz	1855 Hz	2808 Hz	
	<i>Delta</i>	0.96	0.18	1.35	
Kyle	<i>Start</i> (13 weeks)	560 Hz	1772 Hz	2744 Hz	B = -0.3265 p = 0.5196
	<i>End</i> (72 weeks)	556 Hz	1736 Hz	2603 Hz	
	<i>Delta</i>	-0.07	-0.61	-2.39	
James	<i>Start</i> (25 weeks)	579 Hz	1674 Hz	2733 Hz	B = -0.982 p = 0.0512
	<i>End</i> (87 weeks)	559 Hz	1476 Hz	2697 Hz	
	<i>Delta</i>	-0.32	-3.19	-0.58	
Mack	<i>Start</i> (46 weeks)	600 Hz	1787 Hz	2984 Hz	B = -0.5722 p = 0.3104
	<i>End</i> (102 weeks)	612 Hz	1722 Hz	2981 Hz	
	<i>Delta</i>	0.21	-1.16	-0.05	
Dave	<i>Start</i> (65 weeks)	611 Hz	1662 Hz	2719 Hz	B = -0.0769 p = 0.9126
	<i>End</i> (113 weeks)	639 Hz	1637 Hz	2761 Hz	
	<i>Delta</i>	0.60	-0.52	0.88	

5.4.3 Summary of formant frequency findings

Clearly, changes in formant frequency do not follow the same pattern as changes in F0. Despite the fact that there was a significant negative relationship between formant frequencies and weeks on testosterone across the full set of speakers, none of these speakers had independently significant changes in their formant frequencies during the year I recorded them. The correlation between time on testosterone and

formants, then, may reflect inter-speaker variation more than it reflects intra-speaker change over time. However, it is also possible that changes in individual speakers' formants would have been captured with recordings that covered a wider span of time. That is, the inter-speaker variation in length of time on testosterone (about 2 years) is greater than the intra-speaker variation (about 1 year per speaker), so data that includes the same speakers' first and second year on testosterone might reflect the same pattern that shows up on an inter-speaker basis here. Notably, Papp (2011) found lowering of F1 and F2 during the first (and, in a few cases where extended data were available, second) year of testosterone.

The unexpected finding, of course, is that while F1 lowered and F2 stayed level, F3 actually raised among these speakers. There are two facts to explain: first, that the formants did not change uniformly, and second, that F3 went up instead of lowering or showing no change. The fact that not all formant frequencies shifted in the same way suggests that the observed changes are not due to a hormonally driven process of uniform vocal tract lengthening of the sort thought to produce lower formants among non-trans men, which would be expected to produce similar lowering of all three formants. By contrast, these findings could be more easily explained in terms of articulatory shift. Perhaps changes in F1 are more salient than changes in F2 when it comes to certain kinds of (gendered?) sociolinguistic information. Or perhaps F1 was easier for these speakers to lower on a consistent basis than the other formants based on some articulatory factor. But the most likely possibility is that the true pattern of change is more complex than simply lowering F1 versus F2 versus F3. As I suggested in the introduction to this chapter, there is considerable evidence that certain sounds carry special sociolinguistic salience. For example, Mendoza-Denton (2008) focuses on the tensing of /ɪ/ in pre-nasal contexts among Latina high school students in California as a focal point for the negotiation of gang membership and Chicana identities. For this reason, it is important to explore whether patterns of formant frequency change in transmasculine voices may involve some vowels shifting more than others. For example, the fronting of vowels like /u/ and /ow/ takes on gendered meaning in many communities in which these sound changes are currently taking place (e.g. Eckert 2011); for transmasculine speakers, a lower F2 in /u/ and /ow/ might therefore represent a kind of masculinization even if there is no significant downward

movement in F2 as a whole. However, because of the low number of tokens per vowel class in each recording (2 for most classes), further acoustic analysis will be necessary to explore the vowel-by-vowel differences. Based on the findings described in chapter 2, another area for further investigation is variation in speakers' vowel space size, which constitutes another articulatory factor that might be open for change in the voice masculinization process. Whatever the exact processes at work here, the hypothesis that testosterone causes an increase in length of the vocal tract among transmasculine speakers is not supported by these data. The irregularity of the observed changes are much more effectively explained by articulatory shifts, which can be motivated by the sociolinguistic chapters I take up in chapter 6

In order to compare the variation across speakers' formant frequency ranges, Figures 5.2 through 5.4 show speakers' collapsed values for F1, F2, and F3. Rather than sampling speakers at the one year mark, as I did with Figure 5.1, I include a full year's worth of data here. I do this because none of the speakers had a significant change in formant frequencies during this time and because including more data points gives us a more statistically robust picture of which speakers differ from one another. In these figures the degree of overlap in the notches again indicates which speakers are significantly different from one another. When it comes to F1, speakers can be split into two groups. The first includes Adam, James, Kyle, Mack, and Tony, who all had significantly lower values than Carl, Dave, Devin, Elvis, and Pol. When it comes to F2, the notches in this plot single out Carl, who has a significantly higher mean F2 than any other speaker, and James, who has an F2 that is significantly lower than many other speakers. Speakers' means for F3, however, are much more variable than either F1 or F2. Here there is also more of a continuum between the speakers with the lowest frequency F3s – Devin, Adam, and Elvis – to those with the highest – Carl, Dave, Mack, and Pol.

Figure 5.2: Mean F1 for all 10 speakers

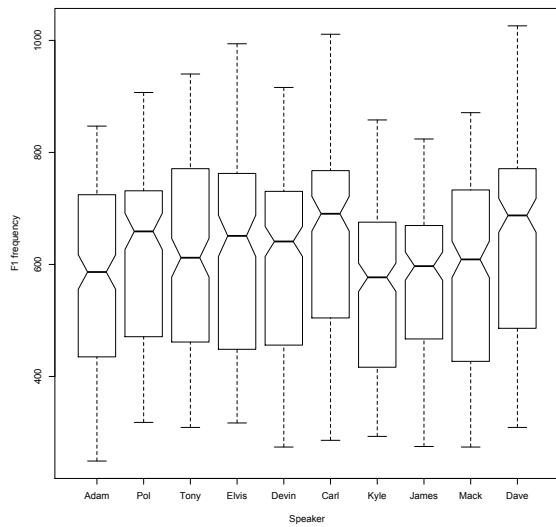


Figure 5.3: Mean F2 for all 10 speakers

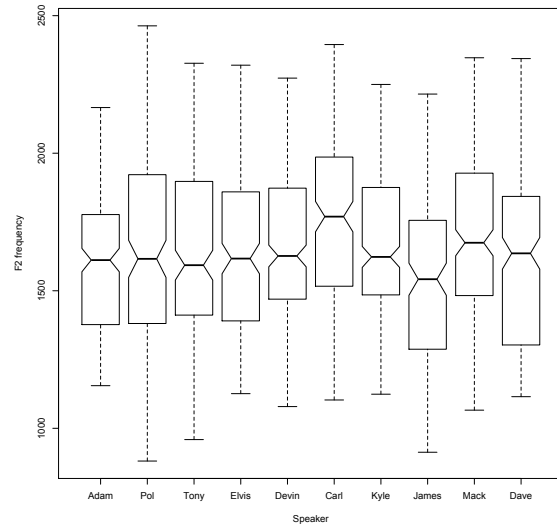
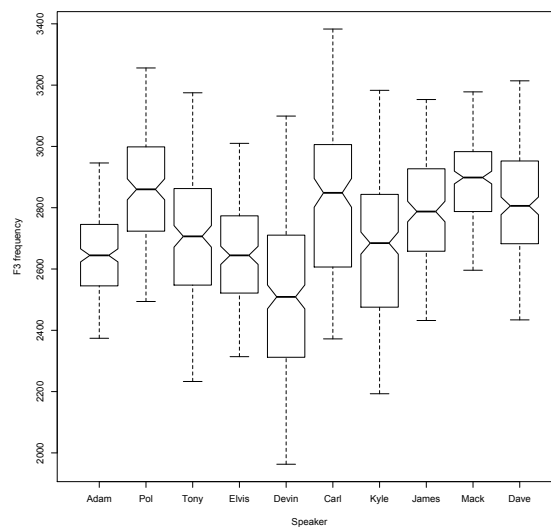


Figure 5.4: Mean F3 for all 10 speakers



There is a great deal of variability in speakers' formant frequency ranges in all three formants, but this variation can be attributed to a number of important factors other than gender including regional dialect and variation in the physiological limits of speakers' vocal tracts. However, it is notable that F1 and F2 are much more similar across these speakers than is F3. Together with the surprising finding that weeks on testosterone was associated with a higher F3 rather than lower, it seems possible that this

variability reflects a qualitative difference between F1 and F2 on the one hand and F3 on the other. F1 and F2 serve to distinguish vowel classes from one another and clearly play an important part in social and linguistic perceptual processes, which has fuelled a great deal of research on sociolinguistic variation for the first two formants. On the other hand, it's striking that Papp (2011) also documents some speakers undergoing an upward shift in F3. Further investigation is certainly warranted.

5.5 The acoustics of [s]

5.5.1 Methods for [s] analysis

Analysis of the sibilant consonant [s] is based on 14 word-initial tokens of [s] that occurred in the Rainbow Passage. Table 5.16 shows the words and sentences in which the tokens appear.

Table 5.16: [s] tokens included in dataset

<u>Token</u>	<u>Word</u>	<u>Context</u>
1	<i>sunlight</i>	When the sunlight strikes raindrops in the air, they act as a prism and
2	<i>strikes</i>	form a rainbow.
3	<i>something</i>	When a man looks for something beyond his reach, his friends say he's
4	<i>centuries</i>	Throughout the centuries, people have explained the rainbow in various
5	<i>some</i>	Some have accepted it as a miracle without physical explanation.
6	<i>sign</i>	The Greeks used to imagine that it was a sign from the gods to foretell
7	<i>sky</i>	The Norsemen considered the rainbow as a bridge over which the gods
8	<i>sun's</i>	Aristotle thought that the rainbow was caused by reflection of the sun's
9	<i>since</i>	Since then physicists have found that it is not reflection, but refraction
10	<i>size</i>	The difference in the rainbow depends considerably upon the size of the
11	<i>size</i>	drops, and the width of the colored band increases as the size of the
12	<i>super-</i> <i>imposition</i>	drops increases.
13	<i>second</i>	The actual primary rainbow observed is said to be the effect of super-
14	<i>since</i>	imposition of a number of bows.
		If the red of the second bow falls upon the green of the first, the result is
		to give a bow with an abnormally wide yellow band, since red and
		green light when mixed form yellow.

Prior to analysis, audio files were pass filtered to remove sound below 1,000 Hz and above 13,000 Hz due to background noise present in some recordings. Filtering this range of frequencies is useful in that the voiceless friction noise in [s] may be particularly sensitive to low grade noise compared to other measures like fundamental frequency. Yet filtering this range has little if any deleterious effect on the acoustic information we hope to extract from [s], as the bulk of the energy in this sound is above 4,000 Hz and typically well below 13,000 Hz or so (see the detailed methods section in Stuart-Smith 2007, which informs my analysis). However, because of differences in filtering these numbers cannot be compared directly with other studies that do not use filtering or filter out a different range of frequencies.

For each token, I created long term averages spectra calculated over the course of the entire token, which plots the amplitude of the range of frequencies present in the acoustic signal (see Figure 5.5). In chapter 2, I described some of the methods used to represent and measure [s] in order to determine which frequencies are most acoustically prominent. I follow Stuart-Smith (2007), Munson (2007), and others in using a “moments” analysis to measure the center of gravity, standard deviation, skew, and kurtosis for each token of [s], using a script that employs Praat’s automated moments analysis functions. As a reminder, center of gravity refers to the weighted mean frequency in the spectrum; standard deviation measures the degree of dispersion of acoustic energy relative to the mean; skew represents whether the acoustic energy is more heavily skewed toward higher frequencies or lower ones; and kurtosis indicates how much more acoustic energy is in the high amplitude frequencies relative to the lower amplitude ones. Figure 5.5 shows one of the spectra generated for speaker Mack, who has a relatively low frequency [s]. The image on the left represents the unfiltered spectrum and the image on the right shows the filtered version (which is truncated below 1,000 Hz and above 13,000 Hz). Of particular interest are two measures that have been most consistently linked to gender differences: center of gravity and skew. As I discussed in chapter 2, English-speaking women have been shown in other studies to have a higher center of gravity and more negative skew for [s] compared to men. Gay-sounding men who speak American English have also been shown to produce [s] with a more negative skew (i.e. a skew

toward high frequencies) than straight-sounding men, though usually without a difference in center of gravity.

Figure 5.5: Spectral slices from Mack

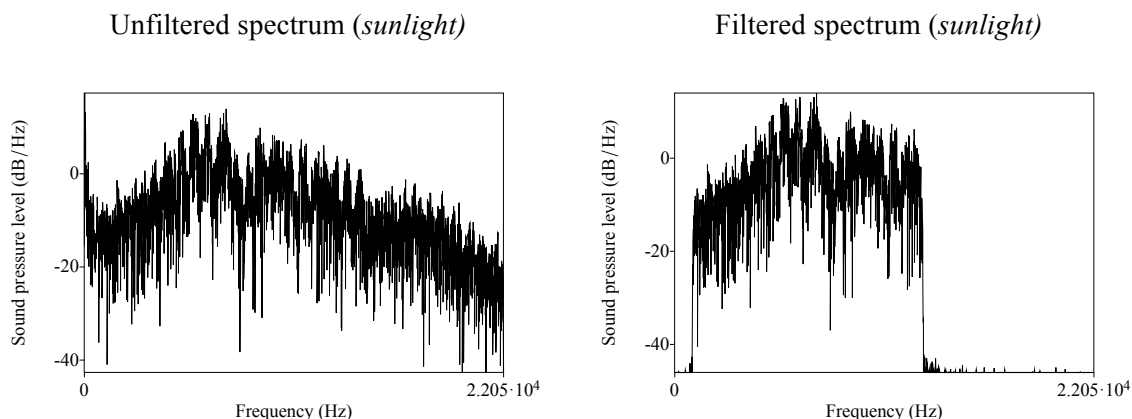


Table 5.17 reproduces the information about speakers from Table 5.2 along with additional details about the five additional speakers who are included in my plot of inter-speaker variance at the end of this section. The total number of tokens for [s] from each speaker is also provided.

For this variable, too, linear mixed effects regressions were constructed beginning with one analysis that encapsulates all 10 speakers. This model used center of gravity as the dependent variable, weeks on testosterone and skew as fixed effects variables, and word and speaker as random effects variables. Skew was included in the model in order to account for any portion of the variance in center of gravity that might be due to differences in skew, which has been associated with different types of sociolinguistic patterning. A second model for all speakers together treated skew as the dependent

Table 5.17: Demographic information and number of tokens for all speakers included in [s] analysis

Speaker	Demographics	Total # of recordings	Total # of [s] tokens
Adam	38, white, queer trans man, upper middle-class family, community program director, from NYC suburbs	12	168
Pol	Queer genderqueer trans boy, 23, white, working class family, student, from Spain (UK English)	8	112
Tony	Queer trans man, 28, white, queer trans man, middle-class family, tech support worker, from the Bay Area	10	140
Elvis	Queer genderqueer/transgender person, 23, white/Jewish, middle-class family, house sitter / barterer, Bay Area	9	126
Devin	Queer genderqueer/transmasculine person, 24, white, middle class family, environmental educator, Bay Area	13	182
Carl	Queer trans man, 22, Filipino, middle class family, recent college grad, Bay Area	9	126
Kyle	Queer trans man, 24, white, working class family, environmental educator, Bay Area	13	182
James	Queer genderqueer trans boy 26, white, upper class family, graduate student, Massachusetts	8	112
Mack	Straight trans man, 46, white, middle class family, bus driver, Bay Area (with ties to South Carolina)	11	154
Dave	Queer trans man, 23, white, upper-middle class family, unemployed artist, Bay Area	11	154
Ethan	Straight man, 48, white, working class family, entrepreneur, suburb of Pittsburgh, PA	4	56
Joe	Straight man, 40, white, working class family, dog groomer/drug & alcohol recovery program, Chicago	5	70
Jeff	Queer trans man, 29, Native American/white, welfare/working class family, unemployed film-maker, Central CA	3	42
Jordan	Queer (trans) man, 22, white, poor/working class family, customer service, rural New York	2	28
Kam	Queer genderqueer trans boy, 28, white, working class family, grad student, Cincinnati, OH	4	56

variable, weeks of testosterone and center of gravity as fixed effects, and word and speaker as random effects. Separate models mirroring each of these were then constructed for individual speakers. At the end of the section I also present an plot of [s] center of gravity values that includes all 15 speakers included in Table 5.17.

5.5.2 Results of [s] analysis

The results from the linear regressions performed across all ten speakers in the longitudinal sample appear in Table 5.18. As these numbers indicate, there is a significant negative correlation between center of

gravity and number of weeks on testosterone ($B = -2.507, p < 0.001$). There is also a negative correlation between skew and weeks on testosterone ($B = -0.0014, p < 0.016$), though it did not reach statistical significance with the adjusted α of 0.005.

Table 5.18: Results of regression analysis for [s]

	<u>Coefficient</u>	<u>p value</u>
Center of gravity (intercept)	B = 7913	$p < 0.001$
Weeks on testosterone	B = -2.5	$p < 0.001$
Skew	B = -916	$p < 0.001$
<hr/>		
Skew (intercept)	B = 4.8013	$p < 0.001$
Weeks on testosterone	B = -0.0014	$p < 0.016$
COG	B = -0.0006	$p < 0.001$

An overview of intra-speaker changes for center of gravity and skew of [s] appears in Table 5.19. As with Tables 5.2 and 5.13 above, this table shows the starting and ending means for both acoustic measures of [s] as well as coefficients, p values, and deltas as a measure of change per week. As the table shows, three speakers had a downward trend in center of gravity over time – including Adam, Tony, and Devin – but only Devin’s correlation reached a p value smaller than 0.005. The other correlation in center of gravity that reached this level of significance was Carl’s ($B = 11.37, p < 0.001$). Carl, however, had a significant **upward** shift in center of gravity. Similarly, when it comes to skew, both Devin and Mack had a significant downward shift, indicating that they more acoustic energy in the higher frequencies of [s].

Table 5.19: Overview of changes in [s]

<u>Speaker</u>		<u>Center of gravity</u> (<u>moment 1</u>)	<u>Skew</u> (<u>moment 3</u>)
Adam	<i>Start</i> (0 weeks)	6867 Hz	1.3334
	<i>End</i> (47 weeks)	6481 Hz	1.9427
	<i>Coefficient</i>	B = -2.401	B = -0.0022
	<i>p value</i>	$p < \mathbf{0.009}^*$	$p < 0.148$
	<i>Delta</i>	-8.21	0.0130

Pol	<i>Start</i> (0 weeks)	7983 Hz	-0.052793
	<i>End</i> (42 weeks)	8151 Hz ⁴³	-0.28418
	<i>Coefficient</i>	B = -7.078	B = -0.0019
	<i>p value</i>	$p < 0.07$	$p < 0.477$
	<i>Delta</i>	4.0	-0.0055
Tony	<i>Start</i> (0 weeks)	6159 Hz	0.7689
	<i>End</i> (47 weeks)	5734 Hz	1.0594
	<i>Coefficient</i>	B = -10.11	B = -0.0019
	<i>p value</i>	$p < 0.007$	$p < 0.093$
	<i>Delta</i>	-9.04	0.0062
Elvis	<i>Start</i> (3 weeks)	7878 Hz	0.2167
	<i>End</i> (71 weeks)	8174 Hz	-0.12531
	<i>Coefficient</i>	B = 0.0462	B = -0.0014
	<i>p value</i>	$p < 0.979$	$p < 0.369$
	<i>Delta</i>	4.35	-0.0050
Devin	<i>Start</i> (8 weeks)	9459 Hz	-0.6139
	<i>End</i> (65 weeks)	8779 Hz	-0.3953
	<i>Coefficient</i>	B = -9.803	B = -0.0047
	<i>p value</i>	$p < \mathbf{0.001} *$	$p < \mathbf{0.001} *$
	<i>Delta</i>	-11.93	0.0038
Carl	<i>Start</i> (10 weeks)	6522 Hz	0.6497
	<i>End</i> (61 weeks)	6877 Hz	0.4271
	<i>Coefficient</i>	B = 6.343	B = 0.0013
	<i>p value</i>	$p < \mathbf{0.004} *$	$p < 0.459$
	<i>Delta</i>	6.96	-0.0044
Kyle	<i>Start</i> (13 weeks)	6777 Hz	0.3596
	<i>End</i> (72 weeks)	6616 Hz	0.5667
	<i>Coefficient</i>	B = 1.623	B = 0.0006
	<i>p value</i>	$p < 0.1791$	$p < 0.5247$
	<i>Delta</i>	-2.73	0.0035
James	<i>Start</i> (25 weeks)	7907 Hz	-0.2999
	<i>End</i> (87 weeks)	7717 Hz	-0.0458
	<i>Coefficient</i>	B = -2.189	B = 0.0006
	<i>p value</i>	$p < 0.282$	$p < 0.651$
	<i>Delta</i>	-3.1	0.0041
Mack	<i>Start</i> (46 weeks)	5788 Hz	1.0339
	<i>End</i> (102 weeks)	5933 Hz	0.8372
	<i>Coefficient</i>	B = -4.145	B = -0.0065
	<i>p value</i>	$p < 0.095$	$p < \mathbf{0.002} *$
	<i>Delta</i>	2.59	-0.0035
Dave	<i>Start</i> (65 weeks)	9014 Hz	-0.0883
	<i>End</i> (113 weeks)	8960 Hz	-0.1916
	<i>Coefficient</i>	B = -1.565	B = -0.0011
	<i>p value</i>	$p < 0.500$	$p < 0.518$
	<i>Delta</i>	-1.13	-0.0022

⁴³ Note that Pol's final recording had a higher mean center of gravity than his first recording, but the overall trend in his center of gravity across his entire dataset is downward.

Because only Devin, Carl, and Mack had statistically significant changes in center of gravity or skew, I show means for each recording's mean center of gravity and skew only for these three speakers. Table 5.20 provides means for 12 recordings made of Devin, who I described above as a 24 year old queer transmasculine person who works as an environmental educator and also avoids identity labels. Devin's downward shift in center of gravity follows a clear, linear pattern, with the exception of his 8th recording, in which he had a higher mean center of gravity than at any other recording date. Fascinatingly, Devin had a downward shift in center of gravity, but also had a significant downward shift in skew. This meant that the mean frequency for Devin's [s] was lower, but that there was a greater concentration of acoustic energy in the frequencies above the mean. As I mentioned above, different sociolinguistic associations have been made with these two measures for [s] – while center of gravity is a consistent marker of gender, skew has also been associated with both gender and perceived sexuality among male speakers.

Looking at the plot of his Devin's skew values appearing beneath Table 5.20, the trend is not apparent the way it is for center of gravity. This is because the finding that Devin's skew decreased was based in a regression that factored in any changes in center of gravity. That is, once you account for the variance in skew that can be explained by changes in center of gravity, Devin's skew got lower over time, rather than higher.

Table 5.20: Mean center of gravity and skew for Devin over time

<u>Recording</u>	<u>Weeks on T</u>	<u>Center of gravity</u>	<u>Skew</u>
1	8	9459 Hz	-0.6139
2	12	9260 Hz	-0.3549
3	18	9392 Hz	-0.4960
4	23	9111 Hz	-0.2721
5	27	9227 Hz	-0.4106
6	31	9506 Hz	-0.5909
7	35	8946 Hz	-0.3337
8	37	10063 Hz	-1.0088
9	41	9343 Hz	-0.6612
10	47	8913 Hz	-0.1932
11	52	8594 Hz	-0.1576
12	57	8848 Hz	-0.4738
13	65	8779 Hz	-0.3953

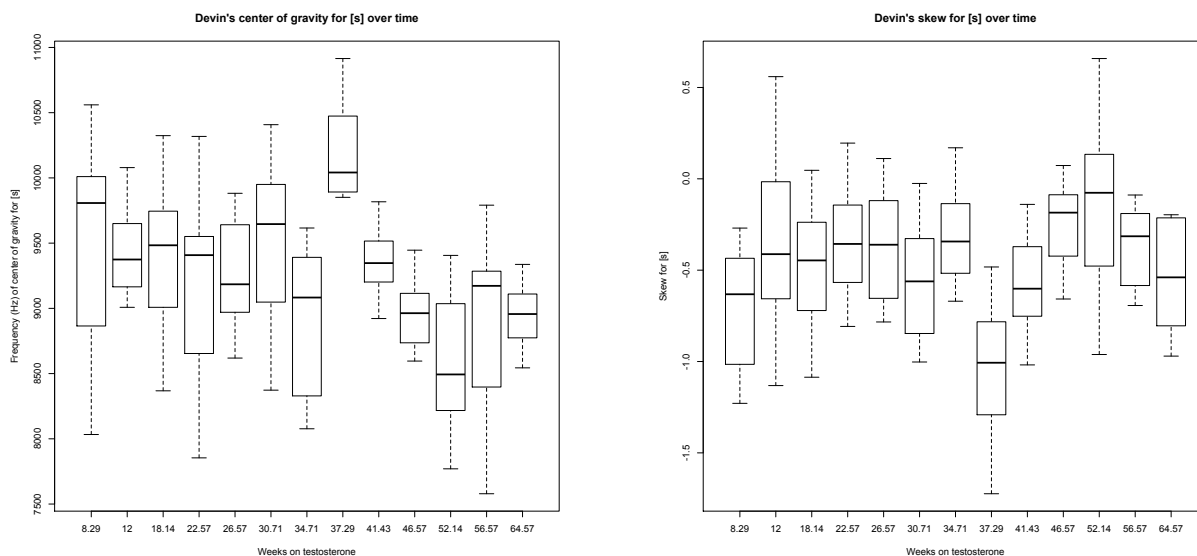
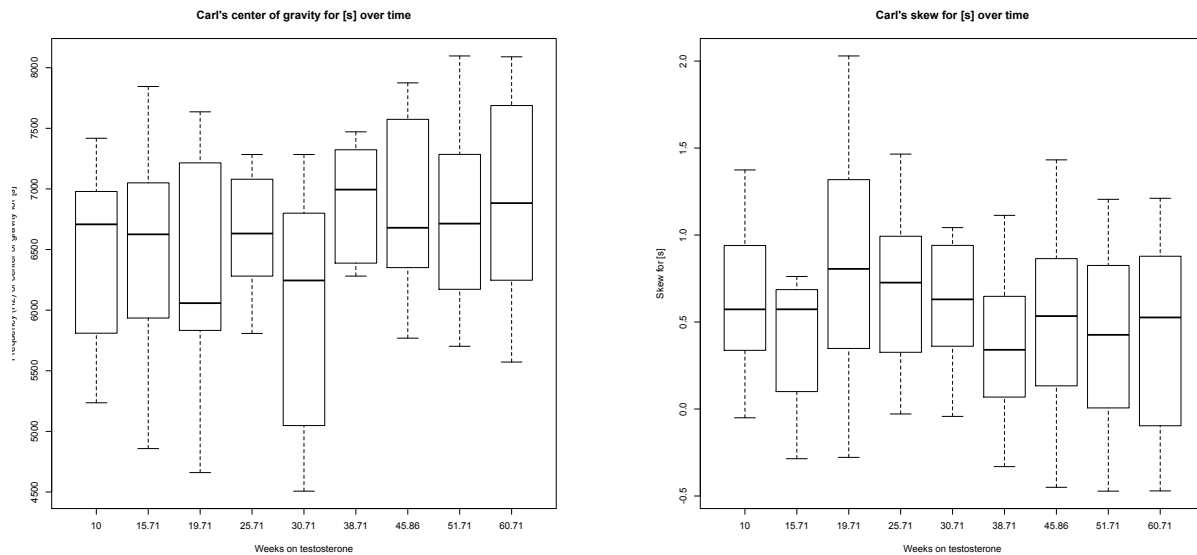


Table 5.21 has means for center of gravity and skew from Carl, the 22 year old Filipino trans man who graduated from college during the period I was recording him. In contrast with the overall trend for these speakers, Carl had a significant increase in his center of gravity over time ($B = 6.343, p < 0.004$), but no significant change in skew.

Table 5.21: Mean center of gravity and skew for Carl over time

<u>Recording</u>	<u>Weeks on T</u>	<u>Center of gravity</u>	<u>Skew</u>
1	10	6522 Hz	0.6497
2	16	6415 Hz	0.4894
3	20	6285 Hz	0.8220
4	26	6260 Hz	0.7376
5	31	6081 Hz	0.7678
6	39	6839 Hz	0.4167
7	46	6920 Hz	0.4976
8	52	6749 Hz	0.4746
9	61	6877 Hz	0.4271



As Table 5.22 illustrates, Mack – the 46 year old straight trans man with a college-age son – is the second speaker to have a change toward a higher frequency [s] rather than a lower one. His [s] did not change in terms of center of gravity, like Carl's did, but he did have a significant decrease in skew ($B = -0.0065$, $p < 0.002$), indicating a skew toward higher frequencies.

Table 5.22: Mean center of gravity and skew for Mack over time

<u>Recording</u>	<u>Weeks on T</u>	<u>Center of gravity</u>	<u>Skew</u>
1	46	5788 Hz	1.0339
2	49	5944 Hz	1.4059
3	53	6293 Hz	1.1638
4	60	6032 Hz	0.9799
5	65	5802 Hz	1.1127
6	70	5689 Hz	1.2276
7	74	5511 Hz	1.1727
8	78	5859 Hz	0.7630
9	83	6387 Hz	0.7436
10	93	5896 Hz	1.1490
11	102	5933 Hz	0.8372

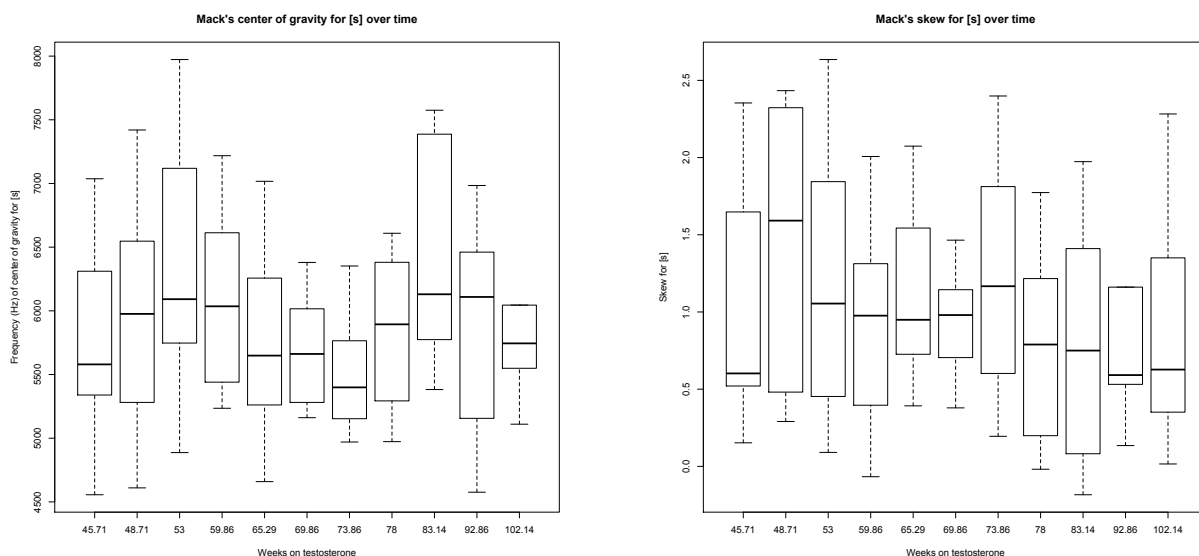
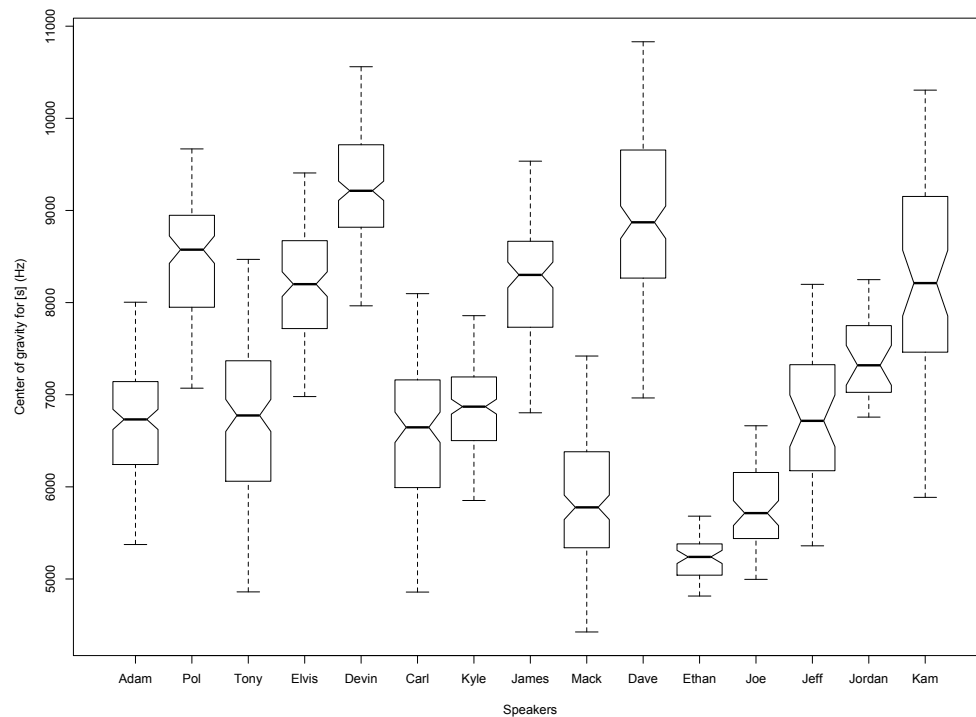


Figure 5.6 provides a chart of center of gravity including the speakers' collapsed datasets, as in Figure 5.1 above, to give a sense of the inter-speaker variation present among these individuals. Five additional speakers are included in this chart (see Table 5.17) despite not having participated in the study long enough to determine whether they underwent any change over time. These five speakers are Ethan, Jordan, Jeff, Joe, and Kam. As with the other figures, the notches in the box plot indicate which speakers' center of gravity values differ significantly from one another. I discuss all 15 of these speakers in chapter 6.

Figure 5.6: Mean center of gravity for 15 speakers



5.5.3 Summary of [s] findings

As in the case of vowel formants, the 10 speakers I recorded for a year long period showed an overall negative relationship between center of gravity for [s] and weeks on testosterone. Devin, the speaker who underwent the most extreme change in F0, also had significant movement in center of gravity, taking him from a mean of 9459 Hz to 8779 Hz. Notably, Devin's overall mean for this measure was the highest of any speaker in this study, and he remained second highest even after his downward shift. At the same time, once center of gravity was controlled for, Devin also had a significant downward shift in skew for [s], indicating that the acoustic energy in [s] was more heavily skewed to the higher frequencies over time, even as the mean frequency decreased. Yet Carl, who occupied a much lower range of frequencies for [s] (see Figure 5.6), had a significant upward shift in mean center of gravity while Mack, like Devin, showed a negative relationship between weeks of testosterone and skew but without a change in center of gravity. Devin's downward movement in center of gravity followed a pattern that was mostly linear,

much as his change in F0 occurred. However, unlike his change in F0, he produced a significantly higher range of values for center of gravity for one of his recordings in the middle of his first year on testosterone. This outlier recording illustrates the potential variability in center of gravity for [s]. Carl's increase in center of gravity followed a somewhat different pattern from Devin's decrease. Carl's change in center of gravity was more abrupt, with the second half of his recordings covering a higher frequency range than the first half.

Across the centers of gravity for the 15 speakers in Figure 5.6, an enormous range of frequencies is covered. Based on the articles reviewed by Flipsen et al. (1999), men would be expected to produce a center of gravity in the range of 4,000 – 7,000 Hz, while women would be expected to occupy the range of 6,500 – 8,100 Hz. These speakers covered this entire range for women and men, with centers of gravity as low as approximately 4,000 Hz (from Mack) and as high as 11,000 Hz (from Devin).

5.6 Conclusion

In this chapter I have presented acoustic analysis of 15 transmasculine individuals in the early stages of a gender role transition with the assistance of testosterone. All 10 of the speakers who I recorded over the course of a year have undergone a significant change in fundamental frequency during their first year on testosterone, though for two of these speakers the changes seem to have happened before they began participating in the study. Less predictably, both formant frequencies and center of gravity for [s] were negatively correlated with the number of weeks a speaker had been on testosterone, as skew for [s].

However, on a formant-by-formant basis, only F1 was negatively correlated with weeks on testosterone, while F3 showed a positive correlation and F2 no significant correlation in either direction. Furthermore, my intra-speaker analysis captured real time changes in the production of [s] that occurred for several speakers. Unlike changes in F0, the observed patterns for formant frequencies and [s] can best be explained articulatorily, in part because of their inconsistency as well as the proven significance of socially-learned gender-based differences for these variables. In chapter 6, I explore the social processes

driving the acoustic changes I have documented, as well as the inter-speaker variation illustrated in Figures 5.1–5.5.

CHAPTER 6

SEX AND GENDER ARE NOT ENOUGH: BREAKING DOWN THE SEX/GENDER BINARY IN EXPLANATIONS FOR TRANSMASCULINE VOICES

6.1 Introduction

Building on the findings presented in chapter 5, this chapter focuses on potential explanations for the changes occurring in the voices of transmasculine speakers in transition based on their performances of the Rainbow Passage. I argue that we must turn to trans people's own frameworks for sex, gender, and sexuality if we hope to understand the results of my acoustic analysis as performances of trans masculinities. Toward this end, section 6.2 draws on talk about gender among participants in this study as well as my participant-observation in several transmasculine communities over the last six years in order to argue for a multi-layered approach to sex, gender, and sexuality. Rather than treating sex as biological and gender as social, I follow queer theorists who have argued that sex and gender are both socially constructed (e.g. Butler 1990). Furthermore, I show how members of local transmasculine communities orient to distinctions between gender assignment, gender role, gender identity, and gender presentation, rather than treating gender as a simple binary or even a singular continuum. Along with a more fluid and context-sensitive understanding of physiological sex and of sexuality, this multi-part approach to gender can take us beyond the now fairly well-entrenched division between sex (as natural) and gender (as cultural). Following an introduction to these concepts and the ways they are talked about by my participants, I then show in section 6.3 how a multi-faceted theory of sex and gender can inform the analysis of transmasculine voices.

A second goal of this chapter is to highlight the very different relationships speakers in this project maintain with masculinity. It might be tempting to compare speakers in chapter 5 in order to see which have been the most “successful” in masculinizing their voices. Yet such a perspective would need to assume that all transmasculine people have similar goals for self-presentation, as if transmasculinity refers to a single, cohesive type of masculinity. In fact, the speakers analyzed here align with masculinity in a variety of ways, ranging from wholeheartedly embracing mainstream, normative manhood to vociferously rejecting hegemonic masculinity. Here, too, the distinction between gender assignment, identity, and presentation allow us to understand the different ways that masculinity can be invoked, with quite different linguistic results.

In writing this dissertation, one of my primary aims has been to examine the proposed origins and development of gender differences in the voice, in order to consider which could be motivated by biological forces and which are more strongly influenced by social processes. I close this chapter by rejecting my own desire to pin down the precise contributions of the body, self-defined identity, or experiences with language socialization. Using the concept of phonetic bricolage (following Hebdige 1979, Eckert 2003, 2004), I show how transmasculine speakers draw on their unique experiences as individuals raised as girls but who nevertheless affiliate themselves with masculinity and/or maleness. Transmasculine *bricoleurs* bring together the phonetic resources available to them – whether provided by childhood language socialization, the biological effects of testosterone, or some other source – in order to improvise phonetic styles that feel authentic while also indexing their complex affiliations with masculinity. The endless possibilities for combining and recombining phonetic characteristics – as well as mixing and matching the elements of sex and gender – undermines binary coding schemas like “male” versus “female” voices, or even “genderqueer” versus “trans man” identities.

6.2 Sex and gender are not enough

6.2.1 Sex as a social construction

The idea that sex and gender are different is one of the foundational contributions of feminist scholarship. It is this distinction – between the biological and the social – that has allowed scholars who place gender at the center of their work to demonstrate that masculinity and femininity are historically- and culturally-bound constructs rather than natural and universal truths. However, the opposition between social gender and biological sex risks naturalizing the categorical differences projected onto ‘male’ and ‘female’ bodies even as affective, behavioral, and interpersonal aspects of gender are denaturalized. Post-structuralist feminists – most famously Judith Butler (1993; also Delphy 1993; Nicholson 1994) – have argued for the last two decades that sex is no more natural than gender, and that **both** are in fact constructed through the lens of a particular place and time. Despite this attention from “third wave” feminist scholars, the perspective that sex is no more natural than gender has in many ways yet to be integrated into mainstream academic understandings of gender and sex, particularly in the social sciences. In fact, many fields continue to struggle with the much simpler argument that behavioral gender differences should not be assumed to derive from biological sex differentiation. In the study of gender and the voice is a key example, as it was only a few years ago that Stuart-Smith (2007) argued to a readership of phoneticians and phonologists for the necessity of recognizing gender as a social process that is distinct from physiological sex – an argument she makes in response to the biological essentialism I described in chapter 2. However, I argue that it is of crucial importance to acknowledge that even where physiology shapes the gendered characteristics of the voice, biology and culture are inextricably bound together in ways that prevent us from ever seeing where the boundary lies.

In this section, I begin with a summary of evidence that currently dominate medico-scientific discourses about biological sex are products of a particular time and place and are no more “natural” than other aspects of gender. In section 5.2.2, I then describe alternative ways of conceptualizing sex that can be found in transmasculine communities, drawing on my previous research in this area (Zimman & Hall 2009; Zimman under review).

The binary between male and female bodies can be most obviously denaturalized by invoking the existence of bodies that defy binary classification. The use of the term *gender role*, in contrast with *sex*,

dates back to research from the 1950s by sexologists like John Money (with John and Jean Hampson, 1955a, 1955b, 1956, 1957), who were interested in developing the role of medical technology in shaping the bodies and lives of people born with anatomy and/or chromosomal configurations that cannot be easily classified as female or male. A major goal in this body of work was to determine whether people with ambiguous bodies could nevertheless be raised in a way that results in gender normative women or men. In so doing, Money and his colleagues challenged the assumption that having a particular kind of body necessarily leads to a particular kind of social identity. Rather than being an opening to reconceptualize gender as we know it, however, this research laid the ground work for contemporary “treatments” for intersex infants and children that attempt to literally erase the embodied evidence that the binary between male and female bodies is a false one. Today, the medical and scientific drive to determine the ‘true’ sex of intersex infants as either female or male (Kessler 1998; Fausto-Sterling 2000) allows intersex conditions to be framed as obstructions of an underlying universal binary.

But this insistence on a binary distinction between male and female bodies is not the unavoidable truth of nature. As was the case for gender, some of the best evidence that sex is socially constructed comes from the diversity that can be found across cultures in how the relationship between gender and the body is understood. And here again some of the most frequently invoked examples of how sex might be differently conceptualized come from bodies that are situated at the borders of female and male. Herdt (1990, 1993) provides a foundational example of this type of study in his investigation of a hormonal condition known as *5-alpha-reductase deficiency*, which leads to ambiguous genitals or “female”-appearing genitals at birth which later masculinize with puberty. This condition exists in relatively high numbers in certain communities, including parts of the Dominican Republic and among the Sambia, with whom Herdt worked in Papua New Guinea. Herdt’s ethnographic research in this community undermines previous accounts of the condition based on Dominican cases. Imperato-McGinley and colleagues (1974) proposed a biologically-motivated theory that individuals with 5-alpha-reductase deficiency undergo a shift in identity, from female to male, as part of the physical masculinization that happens during adolescence (primed by prenatal exposure to “male” hormones). Instead of making this kind of transition

from one gender category to the other, Herdt shows that Sambian individuals with this condition are seen as members of a distinct third sex. This example is only a sample of the diverse ways in which bodies are understood and given meaning across varying cultural contexts.

As a final example, which is one of the most surprising illustrations of the strikingly different ways biological sex can be conceptualized, it is worth considering Thomas Laqueur's (1990) historical research on sex, which demonstrates that sex is constructed for all bodies and not just ambiguously gendered ones. Laqueur documents the rise of the male/female binary in both scientific and popular consciousness in the West during the 18th and 19th centuries, and the simultaneous decline of previously entrenched understandings of women's and men's bodies as fundamentally alike. In the older, "single-sex" perspective on the body that dominated since antiquity, sex was seen as a continuum with women embodying an undeveloped version of the normative male body (much as male children are seen today as undeveloped versions of adult men, but not as members of a distinct sex). This is a disturbing perspective on women, to be sure, because of the way it naturalizes the ideology of women's inferiority to men. Nevertheless, my point here is to point out how the "single-sex" model differs from currently prevailing discourses that say men's and women's bodies are fundamentally different by nature. This is not to say that no gender binary existed before the 18th century; indeed, the single-sex model coexisted with intense dichotomies between women and men that ascribed different personal characteristics – as well as basic rights – to each gender. But the gender binary was not seen as derived from differences in biological essence, as it often is today. Instead, embodied differences were seen as merely one more piece of **evidence** for the more general 'cosmic' difference between women and men, rather than being the **source** of gendered traits (1990:115). According to Laqueur, there existed no "technical term in Latin or Greek, or in the European vernaculars until around 1700, for vagina as the tube or sheath into which its opposite, the penis, fits and through which the infant is born" (p. 5). It wasn't until the beginnings of a new science of gender, which now finds sexual difference in nearly every part of the body, that words like *vagina*, *ovary*, and *uterus* became part of the medical lexicon. Considering this history, it's clear that even the basic idea that male and female bodies are distinct, let alone opposite, biological types, is culturally- and

historically-bound. Furthermore, Laqueur's research highlights the key role of linguistic practice in constructing biological sex (as Motschenbacher 2009 and Zimman forthcoming have also explored).

Butler argues that any attempt to define sex as a natural, biological state is inevitably a cultural act, if only because one must choose precisely where to delineate the natural from the cultural (1993:10-12). There is no obvious point at which these categories can be divided, as physiology and culture intermingle and perpetuate one another as part of the construction of gender difference. For instance, the gender disparity we may perceive when it comes to the average amount of body hair or muscle mass a woman or man has is no doubt influenced by various physiological factors,⁴⁴ but also by fundamentally social choices about things like athletic activities and hair removal practices. And that is true even without mention of the selective attention we pay to examples that fit our expectations while ignoring counter-examples. The erasure of ambiguous bodies becomes clearest (and is at its most literal) through attempts at the surgical elision of sexual ambiguity, but the malleability of sex is also of great significance for those with more normative sexual embodiment because body modification is an everyday part of gender, including sartorial choices, hair style, cosmetics, externally-applied scents, surgical procedures, diet, fitness activities, piercing and tattooing, and so on.

As Butler has addressed (1990, 1993, 2004), none of these arguments about the social construction of sex should be understood as a claim that bodies don't matter. Nor would I advocate for doing away with discussions of "sex" as a means of highlighting embodiment and the processes that shape it. What I am arguing is that bodies are social phenomena that receive their meaning in the same way as other signifiers: not from the inherent properties of the referent itself, but from an always emerging web of social meanings and contexts. The 'femaleness' or 'maleness' of a body part is not natural, but imbued with meaning by the discourse of social actors.

6.2.2 *Complicating "sex"*

⁴⁴ Including ostensibly non-sexual factors, such as a person's heredity, their access to various sources of nutrition, or the presence of any number of medical conditions or disabilities (e.g. alopecia, cerebral palsy).

Trans people are often characterized as individuals who are biologically male but self-identify as women, or who are biologically female but self-identify as men. To take just one example, Cromwell's (1999) multi-sited ethnography of American female-to-male trans people refers consistently to his research participants as "female-bodied men."⁴⁵ More recently, Borba & Ostermann (2007) argue that scholars of gender-crossing individuals and practices, like the Brazilian *travestis* with whom they worked, should pay attention to embodiment precisely because trans people are defined by virtue of the incongruence of their bodies and self-defined genders. Yet there is a set of discourses about biological sex, which have been gaining traction in transmasculine⁴⁶ communities for more than a decade, which allows trans men to object to being categorized as *female-bodied* and, in some cases, to claim the label *male-bodied* instead. In other spaces I have addressed the precise discursive practices through which trans men's bodies can be constructed as male bodies (Zimman under review).

In order to understand why some trans men refuse to categorize themselves as female-bodied, there are three principles we need to consider. The first is that sex is not a single biological trait, but rather an amalgam of numerous characteristics that each exist on a continuum. In this age of genetic science, chromosomal differences sometimes seem like the core truth of sexual differentiation, yet few of us actually know our own genetic karyotypes. In fact, we tend to assume we are XX or XY based on our anatomical characteristics. Anatomical sex includes both reproductive organs and genitals – the so-called "primary" sex characteristics – which are themselves multiple and potentially ambiguous.⁴⁷ The "secondary" sex characteristics, which include the visible signifiers that we rely on in most cases to identify others as male- or female-bodied, are brought about by hormonal processes, whether during a typical puberty or with medical assistance. Additionally, some trans people also make a point of

⁴⁵ See Zimman (2009) for more discussion of the ways transgender people are defined.

⁴⁶ These discourses are not unique to transmasculine communities, and I have certainly heard the same arguments made by trans women. However, my research in this area is limited to transmasculine communities.

⁴⁷ As I explain in greater depth in Zimman (under review), trans people who make use of testosterone and/or certain surgical procedures have changes in their genitals that could be seen as somewhere in between prototypically male or female anatomy.

distinguishing “brain sex” from other indicators of biological sex, driven by the idea that trans men might be born with brains resembling those of non-trans men, while trans women’s brains would be comparable to those of non-trans women. This theory is based on the claims and empirical evidence from (Zhou et al. 1995, Kruijver et al. 2000), though Fausto-Sterling (2000) presents a strong critique of the notion that sex differences exist in the brain at all. The second principle to keep in mind is that biological sex is not fixed, particularly when it comes to the most commonly encountered physical signifiers of gender. Many of these hormonally-induced signifiers of sex – things like body hair growth, baldness, breast development, larynx size, the distribution of fat and muscle mass across the body, even skin texture and body odors – can be altered with masculinizing or feminizing hormone therapy (Gorton, Buth & Spade 2005 on the effects of testosterone). Finally, and most importantly, we need to know that some trans people argue that biological sex should be open to self-definition rather than being assigned by external medico-scientific authorities. This argument mirrors trans community discourses about authentic gender as stemming from self-definition rather than assigned sex. My previous research in this area describes in depth how trans men who self-identify as male-bodied exemplify how biological sex can be reconstructed by recognizing that a body or body part is not inherently female or male but achieves its gendered meaning from social actors.

What, then, does it mean to talk about someone as having “male” or “female” vocal anatomy? Is there even such a thing as a “(fe)male” voice? Based on the research I discussed in chapter 2, and the findings presented in chapter 5, testosterone has an apparent effect on vocal pitch, regardless of whether a person’s body sex at birth is classified as female or male. If androgenic hormones cause an increase in laryngeal size, one might suggest classifying a voice or larynx as male versus female based on its size. At what point, then, does a larynx become male? If there is truly a binary split between male and female vocal anatomy, we should be able to pinpoint the border that separates the two phenomena; yet, like the other aspects of sex I have mentioned, the size of the larynx and vocal tract exist on a continuum. Exactly how big does a larynx have to be to qualify as “male”? If testosterone is what distinguishes male and female vocal anatomy, would pre-pubescent boys have “female” voices? Would certain men, with

small enough larynges, have “female” voices? Or is a “male larynx” simply the larynx of a male person? In the latter case, which seems to be the de facto formula for gendering a voice or larynx, defining a trans person’s larynx as female or male becomes a political act of defining that person’s gender or sex. The challenges these questions pose leave me reluctant to describe the speakers in this study as having “female” voices or vocal anatomy prior to beginning hormones, even as I want to recognize that hormones shape the gendered characteristics of their voices.

As we consider the ways gendered embodiment interacts with the voice, it is important to remember that sex is not static, not purely natural, and that it does not necessarily cause gender differences even where correlations may exist. Furthermore, when we recognize the way trans discourses paint a blurrier and more complex picture of biological sex than we may be accustomed to, we can achieve a more socially-grounded understanding of the ways physiological factors like testosterone interact with the voice. Before I delve fully into this discussion, however, I want to address the way gender is conceptualized by participants in this project as a set of inter-related positionalities that are at once institutional, psycho-social, and semiotic.

6.2.3 *Complicating “gender”*

In the introduction to this dissertation, I defined transmasculine people as transgender individuals who are “assigned to a female gender role at birth.” Though common usage might refer to transmasculine people as having been “born female,” this kind of language is dispreferred in local transmasculine communities. Like others in the LGBT communities, trans people often see themselves as innately trans by birth, whether or not they buy into the brain sex theory just discussed. One trans man in my study, Dave, advocated for the acronyms *(C)AFAB* and *(C)AMAB*, which have relatively recently come into use in activist circles to refer to people as ‘(Coercively) Assigned Female/Male At Birth.’ This move unsettles the notion that trans people are agents in choosing to change gender categories, and instead emphasizes the more powerful social forces that assign our gender without our consent on the basis of physiology. These acronyms are not used by most of my participants, who would often invoke their status as novice

members of the transgender community when terminology like this came up. However, the concept of *gender assignment* was frequently used by participants in this project and other members in their communities as a way of talking about the gender category chosen for them at birth. For the purposes of the analysis below, thinking about gender assignment gives us an opportunity to consider the effects of childhood socialization, for instance, and ask how transmasculine individuals' gender assignment might shape their linguistic practices without conflating assignment and biological sex.

Gender assignment is supposed to determine *gender role*, or a person's social positioning as a woman or man in both interactive and institutional contexts. This includes how we are perceived by others, the gendered language people in our lives use in reference to us, and how we are recognized by various bodies that categorize us based on gender. Common-place references to "having a sex change operation" frame the process of transitioning from male to female, or vice versa, in terms of a change in biological sex. Yet it is the social transformation from one gender role to another that members of local trans communities emphasize as having the most profound affect on their daily lives. Corporeal changes are important in part because they facilitate a social transition in a society where biological sex and social gender are expected to match.⁴⁸

Gender presentation or *expression* highlights the semiotic manifestations of gender and the various ways that an identity like "man" can be enacted. Gender expression consists in part of visual elements like clothing choices, hairstyle, and the presence of facial hair, makeup, and other forms of gendered body modification. Bodily hexis (Bourdieu 1984), including gesture, gait, posture, and so on, are also semiotic resources for gender presentation. Even the shape of the body itself can be read as a part of gender expression – for instance, the display or mere presence of musculature or curves on various parts of the body. And, of course, one of the crucial ways that masculinity and femininity are enacted semiotically is through the voice and linguistic practice more broadly.

⁴⁸ To be sure, many trans people do have strong feelings about their bodies and want to change their physical characteristics in order to bring their bodies more in line with how they see themselves. However, there are also trans people whose physical changes are motivated almost entirely by their desire to change how other see them.

Men and other masculine people have a huge range of gender expressions, including both normative masculinities that align with dominant cultural expectations for men's social practices as well as innumerable non-normative masculinities, and femininities, that in some way or another stray from these norms. Norms for gender presentation vary considerably across communities, of course, and one man's machismo is another man's effeminacy. This is true for non-trans men, and my observations in trans communities indicate that it is true for trans men and other transmasculine people as well.

In older models of transsexuality, which continue to guide clinicians in many places, masculinity or femininity in gender expression are among the prime diagnostic cues of authentic trans identity. Transsexuals are expected to have a lifetime of rejecting masculinity, if they were assigned to a male gender role, or femininity, if they were assigned to a female role. Trans men should have a history of preferring to play with trucks over dolls, wearing conventionally masculine clothing, being attracted to women and only women, and otherwise meeting the demands of heteronormative masculinity. In the introduction to this dissertation, I talk about the rise of *transgender* in 1990s as part of a challenge to the gender normativity built into definitions of transsexuality (Stryker 2008; also Valentine 2007). With this conceptual shift, services like hormone therapy became available to people with a wider range of gendered positionalities, and cities like San Francisco led this trend. In the San Francisco Bay Area a decade after the turn of the century, many transmasculine people on testosterone explicitly reject the idea that they should conform to the requirements of hegemonic masculinity. For some transmasculine people, this rejection may involve not self-identifying as male at all; for others it involves rejecting the label *man* over other options like *trans man* or *boy*, and for others still it might involve embracing the label *man* but rejecting expectations for normative masculine self-presentation. The providers and clinics that specialize in trans health care in the area usually provide hormones on demand rather than requiring that a trans patient be approved by a therapist before being granted access to transition-related medical interventions like testosterone.

Self-identification as *transmasculine* suggests some affiliation with masculinity; but the nature of that affiliation varies wildly. In Table 6.1, I have reproduced some of the demographic information that

appeared in Table 5.17, along with additional details about these 15 speakers' gender identities, gender presentations, and sexual orientations. In this admittedly still reductive summary of their relationships with gender, I draw on participants' own words taken from interviews and conversations on these topics. Incidentally, I was struck by the consistency with which my participants own accounts of their gender expressions matched my perceptions of the type of masculinity they enact.

Table 6.1: Participants' self-described gender identities, presentations, and sexualities

<u>Speaker</u>	<u>Age, ethnicity, class background, profession, place of origin</u>	<u>Gender identity</u>	<u>Gender presentation</u>	<u>Sexuality</u>
Adam	38, white, upper middle class family, community program director, from NYC suburbs	Trans man	Conventionally masculine	Queer (attracted to women)
Pol	23, white, working class family, student, from Spain (UK English)	Genderqueer, trans boy	Dandy	Queer (many different genders)
Tony	28, white, middle-class family, tech support worker, from the Bay Area	Trans man	Typical guy	Queer (women & some trans men)
Elvis	23, white/Jewish, middle-class family, house sitter / barterer, Bay Area	Genderqueer, transgender, but prefers not to use gender labels	Masculine, sensitive guy	Queer (primarily gender normative women & men)
Devin	24, white, middle class family, environmental educator, Bay Area	Genderqueer, transmasculine, transgender, but prefers not to use gender labels	Androgynous, non-binary, mixture of masculine/feminine, but more masculine over time	Queer (initially all genders, later almost exclusively men)
Carl	22, Filipino, middle class family, recent college grad, Bay Area	Trans man	Perceived as a regular straight guy, but over time shifted toward less typically masculine	Straight and queer (women, whether cis or trans)
Kyle	24, white, working class family, environmental educator, Bay Area	Trans man	Blend of queer, outdoorsy & feminist masculinities	Queer (primarily women, but since transition men as well)
James	26, white, upper class family, graduate student, Massachusetts	Transmasculine, genderqueer, trans boy	Queer, dykey, faggy, femme, boyish, flaming, colorful, sparkly & glittery, genderqueer	Queer (many genders, esp. femme queer people & queer non-trans men)

Mack	46, white, middle class family, bus driver, Bay Area (with ties to South Carolina)	Man, trans man	Regular straight guy	Straight (women)
Dave	23, white, upper-middle class family, unemployed artist, Bay Area	Man, trans man	Fem, queeny	Queer, kinky (all genders, esp. butch men)
Ethan	48, white, working class family, entrepreneur, suburb of Pittsburgh, PA	Man	Typical liberal middle-aged white guy	Straight (90% feminine women, 10% "I'm open to it if it looks fun")
Joe	40, white, working class family, dog groomer/drug & alcohol recovery program, Chicago	Man	Regular guy	Straight (women)
Jeff	29, Native American/white, welfare/working class family, unemployed film-maker, Central CA	FTM, trans guy, trans man, neither completely male nor female	Physically masculine, challenges prescribed masculinity in mentality & energy	Queer, pansexual (gender not important in attraction)
Jordan	22, white, poor/working class family, unemployed, rural New York	Man, male, binary	Shifting from more masculine to femme	Pansexual / queer (all genders)
Kam	28, white, working class family, grad student, Cincinnati, OH	Genderqueer, trans boy	Genderqueer, femmey, faggy	Queer/gay (mainly trans & non-trans men, some masculine women)

As the table indicates, several of my participants describe their enactments of masculinity as *typical*, *conventional*, or *regular*. Adam, for instance, told me he has had a very masculine gender presentation his entire life. From the time he came out as gay at age 19 until he started his transition at 38, he lived as a butch lesbian who also used the word *transgender* as an identity label for several years prior to his medical and social transition from female to male. After years of being visibly queer, Adam told me he was somewhat disappointed that his masculinity is “pretty conventional” (a disappointment that drives Adam to maintain a strong allegiance to the identity *trans man*, a point I will discuss shortly). My participants also included people on the other end of the gender spectrum, who had quite feminine gender presentations before their transitions, and who in some cases maintain their outward expression of femininity through their transitions. The clearest example here is Dave, who self-identifies as both a man

and trans man, but who describes his gender presentation as *fem*.⁴⁹ He indexes this femininity with his visual self-presentation – which reflects his preference for tight, form-fitting clothing, often in bright colors or flamboyant prints – as well as his voice and gestural habits. Dave is small in frame and stands just over five feet, but is usually perceived as male, due no doubt due in part to his facial hair and low-pitched voice. Though his fundamental frequency is quite low (with means in the range of 113–126 Hz), Dave also describes his voice as *queeny*. He makes ample use of falsetto voice quality, wild excursions in pitch range that contribute to his engaging and expressive interactional style, and, as the analysis in chapter 4 indicated, he also has one of the highest frequency productions of [s] among all of the speakers in this study. Among those that fall somewhere between Adam and Dave are participants like James, who blends masculine and feminine stylistic elements. James embodies a scruffy, punk aesthetic with simple clothes adorned with hand-modifications like patches, pins and other slogans of anti-authoritarianism. But he blends this rather masculine baseline style, which is enhanced by his unshaven facial hair, with much less normatively masculine accessories like the bright green bandana he had tied jauntily around his neck when we first met, the glittery jewelry he habitually wears in his facial and ear piercings, and toenail polish in various colors. He described his gender presentation with a series of adjectives that are sometimes intentionally contradictory, including *dykey*, *faggy*, *femme*, *boyish*, *flaming*, *colorful*, *sparkly and glittery*, *queer*, and *genderqueer*.

One of the important dimensions of gender presentation that I have not addressed is the intersections of gender and sexuality with race, class, and other social positionalities. As I mentioned when I discussed my sample of speakers in chapter 3, Carl was the only self-identified person of color in my study (though Jeff, one of my non-longitudinal speakers, describes himself as white and Native American). However, I did have the opportunity to speak with trans people of color during the course of my research who raised interesting questions about the relationship between gender, race, and the voice. Specifically, two Black trans men in their 30s who struck me as quite masculine and unambiguously male

⁴⁹ Dave follows the convention of using *femme* as a modifier for female-identified people and *fem* in reference to those who are male-identified. By contrast, James referred to himself as *femme* in an email exchange. I use the spelling preferred by each in Table 6.1.

in appearance told me that they were still occasionally perceived as women, but only by other African Americans. Furthermore, that they believed their voices played a crucial role in this perception. Given that these individuals were speakers of African American English, their observations suggest speakers of different varieties of American English might be tapping into different acoustic cues when engaged in the rather basic task of categorizing speakers by gender; this is a question for future perceptual analysis. Because African Americans are ideologically situated as hyper-masculine (e.g. Collins 2004), it may not only be an issue of insider versus outsider status, but also related to the hyper-masculinization of Black bodies, including “female” bodies. Carl did not report having similar experiences when it came to the way he was perceived by other Filipinos or other Asians and Pacific Islanders compared to the way he was perceived by members of other groups. There is little published research on the sociocultural linguistic practices of Filipinos in the diaspora (with the exception of McElhinny et al.’s 2009 work on Filipino Canadians’ discourse), so it is difficult to place Carl within a broader sociolinguistic context. However, I return to the significance of Carl’s ethnicity in section 6.3. A full analysis of either race or socioeconomic class is unfortunately outside of the scope of this discussion, but remains an important issue to be addressed in my future work.

Trans men like Dave who embrace femininity are often met with confusion or even bald-faced challenges from people in their lives who cannot reconcile their self-identification as (trans) men with their feminine self-presentation. But it is precisely this distinction between identity and presentation that makes Dave’s self-understanding as a fem trans man possible. In both academic research on trans people and within trans communities themselves, the phrase *gender identity* is frequently used to talk about an individual’s self-identified gender category: in other words, whether one thinks of oneself as a woman, as a man, or with one of the other identities available in a given community. We can expand on common psychological definitions of gender identity found in places like the *DSM-IV* – self-identification as female or male – to include identifications like *genderqueer* versus *trans*; *man* versus *trans man*; and *trans man* versus *trans boy*. Yet an individual’s identity as a man, a trans man, a boy, or genderqueer does

not tell you what his gender presentation will be like. Before moving on to my analysis of transmasculine phonetic style, let's look at some examples of the ways my participants described their identities.

Excerpt 6.1 comes from my first conversation with Dave, in which he tells me about his coming out process. Dave came out as trans while dating a femme lesbian who had encouraged him to explore his feminine side more than he had previously done. He went from being a tomboy throughout middle and high school to being really excited about the accoutrements of femininity, which happened only shortly before he began telling people he self-identifies as a man (line 30). On other occasions, he told me about some of the more specific negative reactions he got, both from his ex-girlfriend and from friends, who initially expressed a great deal of doubt that he could be fem and a (trans) man at the same time. The snippet of conversation that appears in this segment picks up right after Dave told me about attending a local conference on fem(me) gender identities and practices.

Excerpt 6.1, Dave (at 64 weeks on testosterone)

19 DM: ((sigh)) Cause it's always been really complicated and that was
 20 actually part of the, I think, coming out process for me, was that fem
 21 identity [and how it related to my male, very male self-identity.
 22 LZ: [Mm.
 23 DM: Um. 'Cause I was dating a femme lesbian who's attracted to femme
 24 lesbians, um, like, very, extremely femme. Like, [wears corsets, and=
 25 LZ: [Mhm.
 26 DM: =heels, and makes her own vintage Victorian [clothing, and has hair
 27 LZ: [Mm.
 28 DM: down to her knees, [and like, just as femme as it is humanly poss[ible=
 29 LZ: [Mm, mhm. [Mhm.
 30 DM: =to be.
 31 LZ: Mhm.
 32 DM: And was very attracted to other very very femme people. So when, before
 33 she and I started dating, and when I was dating her, I was like, wow, this
 34 person's really into femme stuff, and I've never really gotten to
 35 experiment with that at all. Cause I'd really been tomboyish for pretty
 36 much all of middle school, all of high school, and most of college until
 37 then, we started dating midway through my [Women's College] degree. Um.
 38 And so I was like, y'know what, let's give this whole thing a go. I've
 39 always been kind of curious about that and I've never really done it,
 40 let's see how it feels.
 41 LZ: Mhm.
 42 DM: And so I started trying it and it was really fun, and I really enjoyed
 43 it, which was part of the reason it was hard for me to come out as trans
 44 when I did. Because first I'd been totally tomboy, and then be like
 45 ^"whee, femme, [everything is amazing!"^ Garters and stockings and make=
 46 LZ: [((laughing))
 47 DM: =up and leg-waxing parties and, like, everything, like the whole
 48 shebang. Totally went the full hog. And then was like, "Now I'm a man."
 49 LZ: ((laugh))
 50 DM: And everybody was like, "You're crazy." And I'm like, "No, no, no."

Incidentally, though he describes himself here as having a “fem identity,” on other occasion he refers to his femininity as a matter of gender presentation, which is also suggested by his focus on outward semiotic indexes of femininity: feminine clothing, especially corsets, lingerie and, high heels, and lack of body hair. Furthermore, in lines 2-3 of Excerpt 1 he contrasts his “fem identity” with his “very male self-identity,” tapping into the norm of talking about *self-identified gender* interchangeably with *gender identity*. Despite his interest in feminine self-presentation, Dave does not identify as genderqueer and instead describes himself as “a man,” “very male,” and “binary-identified.”⁵⁰ At the same time, the way Dave talks about *fem* as an identity shows that the lines between gender expression and identity are sometimes blurry, even as speakers orient to some degree of distinction.

Some of the participants in my research identify strongly with conventional labels for masculine identities like *man* and *male*. Joe, for example, a 40 year old working-class white man from Chicago who began his transition following a long entanglement with drug addiction and incarceration in a women’s prison, told me he felt like “just a guy” rather than a trans guy. He recognizes that his life has been quite different from what most men experience, but he doesn’t see his trans status as a strong component of his identity; instead, he said labels like *trans* are a way for him to explain why his experiences and body configuration are not typically male. His gender presentation, too, is quite masculine: he wears his blond hair in a cropped cut that goes well with his athletic wardrobe including numerous sports jerseys and – as Joe is a true Chicagoan – a well-worn Cubs baseball cap. He would often meet me between trips to the gym when I would visit him in the quiet, affluent San Francisco suburb where he had been placed in a sober living house for women (where he felt like an outsider much of the time for more reasons than one).

A larger number of my participants, in contrast with Joe, identify most strongly with the identity *trans man*. Trans men feel that their gender-crossing experiences are significant enough to constitute a

⁵⁰ *Binary-identified* refers to people whose gender identities fall within the gender binary rather than outside of it. People who identify as genderqueer or who otherwise do not self-identify as female or male can be referred to as *non-binary identified*.

distinct gender identity, and they see important differences between themselves and non-trans men. For example, trans men who have spent many years in lesbian communities may invoke their sense of connection with queer or gender non-conforming women as a distinguishing quality that separates them from men who were assigned male at birth. Yet it isn't necessarily lived experience that distinguishes the trans men from the men – Joe, too, participated in lesbian communities for many years. In either aligning or disaligning with the unmarked identity *man*, the participants in my study are engaged in the processes Bucholtz and Hall (2004, 2005) have identified as *adequation* and *distinction*. Adequation and distinction are two of Bucholtz and Hall's six tactics of intersubjectivity, which provide a framework for understanding the linguistic construction of identity. *Adequation* refers to the process of constructing sufficient similarity: in this case, those who identify simply as men create adequation between themselves and non-trans men by emphasizing similarities while placing less value on any differences that might exist. The individuals who self-identify as trans men, on the other hand, highlight differences between trans and non-trans men. What those differences are is also a matter of contention.

Mack is an example of someone who was in the process of negotiating his identity as a *trans man*, as opposed to a *man*; on some occasions he seemed more comfortable with the former label, and on other occasions he preferred the latter. During one of our conversations in the house he shared with roommates in the southern outskirts of San Francisco, Mack told me about his relationship to various shades of transmasculine identity, which I excerpt below. He is a 46 year old straight white trans man who grew up in a family originally from South Carolina that moved around among the suburbs of the San Francisco Bay Area. After living as a lesbian for several decades, though always with an uneasy relationship with that label, Mack came to see a male identity as a more authentic expression of his inner self. He had been on testosterone for nearly a year and a half when we had this conversation, though he still occupied a somewhat androgynous social space; recall from chapter 5 that he has the highest F0 of any speaker in the study. Just prior to the snippet in Excerpt 1, Mack was telling me about the trouble he has relating to transmasculine people who identify as somewhere in between male and female, or who maintain strong ties with queer women-centered communities or identities. As a follow-up, I asked him

whether he relates to the identity *trans man* as a category distinct from *man*. Although Mack had just told me that he feels like he “*should* be a regular straight guy” (emphasis mine), he “wonder[s] if that’s really possible” for him (lines 10-12).

Excerpt 6.2, Mack (70 weeks on testosterone)

01 LZ: What about, like, guys who specifically identify as, like, not men
 02 much as, like, trans men. As like, almost like a third category. Do you
 03 understand that perspective, or?
 04 MD: Yeah, I understand that. Yeah, I do, I do. And uh. Because I feel
 05 like, I wonder about myself, if, like once my transition is done, y'know?
 06 And, y'know, I'm physically male and being perceived as male, moving
 07 through the world as male, I have this sneaking suspicion in the back of
 08 my mind that the end product isn't gonna be a regular average male
 09 anyway. Y'know, just because uh, of my upbringing and all my years of
 10 female socialize- socialization? Y'know? So I feel- although I feel like
 11 I should just be like a regular straight guy, I- I kinda wonder if that's
 12 really possible. Y'know, in me, anyway. Y'know, when I think about me.
 13 So, I- I- I- I think I understand guys like that, y'know. (...) I mean,
 14 never had a male boyho-, never had male adolescence, y'know?

Here, Mack invokes the fact that he did not grow up in a male gender role, and the socialization experiences he missed out on as a result, as something that differentiates him from non-trans men. Transmasculine people who engage in adequation, by contrast, might point out that men have a wide range of socialization experiences, and that many men grow up without the archetypal experiences of white, middle-class American boyhood but see themselves as men nonetheless. Importantly, when Mack wonders whether it’s possible to turn out as a “regular straight guy,” he quickly adds the caveat “y’know, in me, anyway” (line 12), reflecting his awareness that many trans men do see themselves as regular straight guys regardless of their socialization experiences, and that the tendency to adequate or distinguish trans and cis men is a source of tension in the community.

For some people, their identification as trans men is political more than it is based in the notion that trans men are necessarily different from non-trans men. Excerpt 6.3 provides an example of this perspective from a conversation I had with Adam, a 38 year old queer-identified trans man from New York who I described above as being somewhat disappointed about how “conventional” his masculinity is. One of the first times I met with Adam at his office in Silicon Valley, before he begun testosterone

therapy, I asked him about some of the labels different transmasculine people use, and he told me about his preference for the identity “trans man.” Adam works as a program director for an organization that serves queer youth, and his identity as an activist is one that he invoked when he told me about his interest in maintaining an openly trans identity (line 19). At the same time, he signals his awareness that this may change over time, and that trans men often talk about having a shift in the degree of importance they ascribe to their trans status (lines 27-31).

Excerpt 6.3, Adam (0 weeks on testosterone)

01 LZ: I was wondering - how do you feel about different kinds of, like, identity
 02 labels that trans people use, as far as like, I don't know if you care
 03 about, like, "transsexual" versus "transgender" versus "trans" or:,
 04 AR: I guess right now, I'm like, when I explain myself to people I usually say
 05 "transgender" or "transgender male." I don't really f- I, I personally just
 06 don't feel the word "transsexual". Somethin' about it, I don't like. But, I
 07 don't care if other people use it, y'know?
 08 LZ: (Right.)
 09 AR: But I think I- sometimes I'll say like "trans man" when I'm talking with
 10 people that I know understand?
 11 LZ: Mhm.
 12 AR: Um, or I'll just say "trans." But I guess, right now, I identify as
 13 "transgender man." Um, I had to fill out a form the other day that, I had to
 14 pick male or female. Y'know, 'cause most forms you don't get an option. And
 15 I put, I put "transgender" on there, just wrote it in. But I was thinking "I
 16 guess I could w- be putting "male" at some point, too." But I don't think
 17 I'm ever gonna want to do that.=
 18 LZ: (Mm.)
 19 AR: ='Cause I'm just, I'm an activist.=
 20 LZ: Mhm.
 21 AR: =So,
 22 LZ: Yeah.
 23 AR: Not everybody has to do that, I'm not, like I'm a major activist for people
 24 to be able t-, to (.) express their identity however they feel comfortable.
 25 Like everybody else needs to just suck it up.
 26 LZ: Mhm.
 27 AR: But, (.) I don't know if that'll change too. Like, I've heard trans guys who
 28 talk about, like, later on down the road how a lot of their thoughts about
 29 it changed as their identity and their body changed, and all that. So, I'm
 30 kinda open to whatever is gonna be is gonna be, and this is where I'm at
 31 right now. I'm a trans guy.

Other transmasculine people are uncomfortable with the word *man* in any context, and instead situate themselves somewhere else on the gender spectrum. Often, transmasculine people talk about feeling uncomfortable with the word *man* because of its association with gender-based dominance or gender privilege. Jeff, for instance, described himself primarily as a *trans guy* even though he felt *trans*

man was also an accurate description of him. Three of the speakers in my study, James, Pol, and Kam, describe themselves as (*trans*) *boys* rather than (*trans*) *men* in part for this reason. However, these boys also use the word *genderqueer* to describe themselves, as do Elvis and Devin, indicating that they feel their gender does not fit well into either side of the gender binary. The latter two participants also told me that they prefer not to put their identity to words if they don't have to – though they find that in some contexts that is an unavoidable challenge.

Excerpt 3 comes from one of my earliest interactions with James, who over the 4 years before I met him had shifted from identifying strictly as genderqueer to also using the labels *transgender*, *FTM* (female-to-male), and *trans boy*. He started his process slowly, beginning by binding his chest, then using a masculine name, then using a mixture of male and female pronouns that later shifted to only male pronouns, and most recently shifted again with his the decision to go on testosterone. Later in this same conversation, James told me he surprised himself with this choice because throughout his college years he thought he would never feel the need to change his body medically. But once he left the “bubble,” as he put it, of his progressive women’s school, he found it difficult to find acknowledgement of his masculinity because of how his body and voice were perceived.

Excerpt 6.4, James (21 weeks on testosterone)

32 LZ: So how about trans-related stuff? What do you have to say about that?
 33 ((laughs))
 34 JP: ((laughs)) Um:. What do I have to say about that. Uh. So I guess I've
 35 like, sort of, identifying somewhere on the trans/genderqueer spectrum for
 36 four years now? And I think that sort of started soon after I got to
 37 [Women's College] and, y'know, was like having conversations with friends
 38 about sort of I guess more genderqueerness and sort of the possibilities.
 39 I think I had seen, um, a lot of folks who just from just went from like
 40 (xxx) (I don't want to say) extreme, but were immediately like, (now) I
 41 use male nouns, I use male pronouns, and, and binding and all these other
 42 things. And I k- sort of didn't feel like I was there yet, and I was (like
 43 hanging) with friends who were like still using their same name and
 44 pronoun but like started binding, or like, maybe were using more like
 45 gender-neutral pronouns, or like whatever else. And I sort of, kind of
 46 started expanding my ideas of like, (well), my options and just like
 47 wanting to explore that. So, um. I think I started my whole journey with
 48 just like binding and feeling like, really excited about that=
 49 LZ: (Mhm.)
 50 JP: =and how that looked and I guess kind of went from there. ((clears
 51 throat)) and then: yeah, I mean I could like you like the st- like the
 52 full story, like I can like give you a lot [of deets
 53 LZ: [Sure! Yeah. Why not. ((laugh))

54 JP: Okay. Um ((laughing)) So then I feel like I: was doing that, and then,
 55 I don't know, I feel like I was getting frustrated that I: I didn't, I
 56 guess, feel like my m- m- masculinity was really being, like, read or like
 57 respected particularly maybe by like family members, or even on the
 58 street, and I just felt like, because, even though like I looked like
 59 really like butch maybe to some people, and was binding and, as soon as
 60 like, I felt like, y'know, my legal name was said I just felt like, it
 61 felt like my like masculinity was a little bit erased, and I was like oh,
 62 I w- that feels frustrating and I wanna ((sighs)) figure out a way to feel
 63 more seen in that and so then I decided to start going by [James] and
 64 still using female pronouns, and binding. And then: eventually started
 65 having friends go back and forth between male and female pronouns, um,
 66 trying that on for size. I feel like probably within like a year, about,
 67 like it got to a point where I was like actually, like, just male pronouns
 68 feel good, and better. Um. So, so that's sort of where I landed, about 1-
 69 I think it's been like three years now. Um. I think I still, like, very
 70 strongly identify as genderqueer. Sort of like (on the FTM) spectrum
 71 though.

Nearly all of the accounts I got when I asked why my participants identified with the categories they do emphasized a subjective sense of authenticity. “It just feels right,” as Dave put it. These uncomplicated explanations depart radically from those elicited in some studies of trans identity narratives like the work of Gagné and Tewskbury (1997), who analyze primarily the narratives of trans women and conclude that gender stereotypes form the basis of transgender people’s sense of gendered authenticity (see also Zimman 2009 on transgender narratives of identity). Authenticity is key, to be sure, but for the speakers I describe in this chapter, their idea of an authentic self is derived from an abstract yet deeply felt sense of self and not from adherence to gender norms. As I discuss in my (2009) article, my status as a community member no doubt made it less necessary to justify their identity to a potentially skeptical outsider. Respect for others’ self-identified gender is one of the most basic principles of good community membership in all of the trans communities with whom I have interacted. And, to be fair, I was asking participants why they identified as genderqueer rather than trans men, for instance; I never asked them why they identified as men or masculine instead of seeing themselves as women.

My discussion of gender so far is separable from sexuality, in a sense. As Valentine (2007) describes, transgender identity has been institutionalized by providers and researchers as a phenomenon that is completely distinct from gay and lesbian identity. Often, this discourse arises in response to the still quite powerful ideology that transgender is fundamentally about sexuality, such that trans men are a

subtype of lesbian, perhaps at the extreme end of a spectrum, while trans women are the gayest of all gay men (or, less charitably, sex-crazed perverts; Serano 2007). It is important to recognize a distinction between transgender identity and sexual desire, then, if only in recognition that some trans men have never had a connection to lesbian or queer women's communities. Gay trans men, for instance, may have identified as straight before transition and are likely to have stronger connections with gay/queer non-trans men than lesbian/queer non-trans women.

At the same time, sexuality is undeniably a lens through which transmasculinity is constituted (see also Vidal-Ortiz 2002). And it is clear that, for the participants in my study, identification as *queer* or *straight* (the two identity labels they most often used when talking about their own sexualities) is driven not only by erotic attraction but also by gender identities and gendered life histories. Transmasculine people are by no means unique in this respect, but the ways in which participants in this study describe their sexualities explicitly challenge mainstream assumptions about the nature of sexuality-driven identities. As Table 5.1 shows, 12 out of the 15 the participants analyzed describe themselves as *queer*; the remaining speakers, Mack, Joe and Ethan, self-identify as straight based on their identities as men who are attracted only to women. Yet this only tells us part of the story, because Carl and Adam are also attracted only to women but see themselves as queer. More confusingly still, Carl at times describes himself as straight, but over time seemed to increasingly self-identify as queer. Other transmasculine individuals identify as queer because of their attraction to men, and may see their attraction to women as straight or queer. Finally, many trans people are attracted to genders that are outside of the male-female binary – and may not classify themselves within that binary either – so that identification as queer can signal that their desires go beyond binary-based labels like *hetero-*, *homo-*, and *bisexual*.

For trans men who are attracted only to women, a queer and/or openly trans identity are both ways to negotiate visibility as something other than a straight, gender normative, non-trans man. Desiring visibility as a member of either imagined or practice-based queer communities (see chapter 2) is not universal among my participants, but for those who do prefer to be recognized as queer, identification as such can be strongly linked to their self-identification as trans men (rather than just men). For trans men

like Tony, whose main connection to other transmasculine people was through his participation in an online forum for butch and femme queer women as well as those on the transmasculine identity spectrum, it was important to highlight his ties with queer women. Tony and his partner – a cis woman who describes herself as a transsensual⁵¹ lesbian femme – both said they were attracted to women and trans men (but not cis men). This mode of grouping attractions, which links people together on the basis of assigned sex rather than gender identity or even current sex, is not an uncommon one among local lesbian-identified women who date trans men. The way gender groups are organized has important political implications for trans people, and for this reason the very idea of being attracted to women and trans men has come under fire from some corners of the trans community. Dave, as a community member who is perpetually engaged with linguistic issues in this way, argued that pairing “women and trans men” together – which local trans theorist and activist Julia Serano has called the “FAAB [i.e. Female Assigned At Birth] mentality” (Serano 2012) – prioritizes assigned sex over self-identified gender. This suggests to Dave, and many other community members I worked with, that trans men are somehow less male than non-trans men. Furthermore, Serano argues that the “women” in the “women and trans men” equation are implicitly assumed to be cis women, which delegitimizes trans women’s self-identified genders. Critics of the FAAB mentality are also often engaged in the push to recognize that trans women are not (necessarily) male-bodied, and that trans men are not (necessarily) female-bodied. This convergence makes sense, given that embodiment is frequently an important element of erotic attraction and is one factor invoked by those who are attracted to trans men but not non-trans men. But more often, “women and trans men” stands in for a much more complex set of desires, including presumptions about trans embodiment; for example, when I prodded Tony further about why he is attracted to trans men but not non-trans men, he told me that he isn’t interested in having sex with someone who has a penis because he doesn’t enjoy being penetrated. When I asked how he felt about trans men who have penises, or non-trans men who might not want to penetrate him (and might even want to be penetrated by him), say, he

⁵¹ *Transsensual* is a somewhat infrequently used word to denote a special attraction to trans people. It carries a positive connotation among those who use it, in contrast to denigrating terms for those who seek out trans people for sex or relationships, like (*tranny*) *chaser*.

told me he hadn't considered those possibilities. My interest here is not to single out the way that Tony makes sense of his sexual desires as somehow less well-reasoned than other participants' – particularly given that they serve him well in the communities in which he participates – but rather to highlight the politicization of the various ways gender-driven desires are talked about by members of local trans communities.

In an attempt to capture a bit of the complexity I have just described, Table 6.1 includes information about the gender groups to which my participants report being attracted as well as the sexuality-based identities they claim. In contrast to Tony's interest in women and trans men, other participants described their attractions in terms of gender identity, gender presentation, or without respect to gender. Kam, for instance, is mainly attracted to people with masculine gender presentations, primarily in the form of trans and cis men, but also including some butch women. Elvis said he is mostly attracted to gender normative men and gender normative women. Carl is interested in people who self-identify as women. Jeff describes himself as pansexual, as well as queer, and says he is attracted to the energy an individual puts out, regardless of gender. Pol, on the other hand, is attracted to a wide range of genders, but also says he is attracted to people "through their genders," in that gender plays a role in his attractions even though his attraction isn't limited to certain gender groups. This issue of gender dynamics between partners often plays a role in the changes many transmasculine people experience during their transitions. When I met him, Devin was attracted to all genders, but found himself almost exclusively interested in men around the end of his first year on testosterone. Similarly, Kyle reported that he found himself attracted to men for the first time since beginning testosterone, which is not an uncommon experience for trans people (some in the community joke that "testosterone makes you gay," though Kowell 2008 discusses socio-psychological explanations for transition-related shifts in sexuality).

There are other significant ways that gender and sexuality intersect for these transmasculine individuals, which merit further consideration in other spaces. To provide one example, in my conversation with Dave that is excerpted above he told me that his interest in certain markers of femininity is also connected to his sexuality, which he identifies as both *queer* and *kinky*. Because

women's clothing is often designed to restrain and display the body, he finds items like corsets and high heels fulfill his erotic desire to be restrained, controlled, and sexually objectified. His attractions to others also connect to his fem gender expression: he told me through email that he is "MOST attracted to butch, stocky muscular men, partly because of the way they make my fem gender obvious by comparison"; while "the gender category it's most difficult for [him] to date is femme women [...] who are more able to express fem genders in public than [he is]."

There are several important points to take away from this section before moving on. First, people who describe themselves as transmasculine lay claim on an array of gender identities and gender expressions. Second, the layers of identity, presentation, assignment, and embodiment that transmasculine people draw on when they talk about gender provide a framework we can use to understand the phonetic variation we saw in chapter 4. These layers do not necessarily align with each other in predictable ways; yet this is not a special fact about transmasculine people. Even as trans masculinities bring the disjunctures of gender into sharper focus, gender assignment, expression, and identity are separable, fluid elements of gender normative cis men's and women's experience as well. If we hope to understand the range of ways that the layers of gender, sex, and sexuality can be combined and recombined, a simple binary between sex and gender is simply not enough.

6.3 Accounting for transmasculine phonetic styles

One story that could be told about the data I presented in chapter 5 is that some speakers have been more successful than others in masculinizing their voices than others. And indeed, I did find more extensive acoustic changes among some speakers than others. As I discussed in chapter 4, the focus on "success" that is found in much of the language pathology literature on trans voices depends on the assumption that trans people share a common stylistic target. Specifically, it would require the assumption that transmasculine people aspire to sound like hetero- and gender normative men. When we consider the complicated relationships these speakers have with masculinity, a more compelling explanation for their

inter- and intra-speaker variation alike can be reached by recognizing the possibility of detaching and recombining the multiple layers of sex and gender I have just identified.

With an emphasis on the notion of “success” comes a related interest in trans people’s ability to engage in self-conscious, agentively driven changes in their linguistic styles. Though speakers’ intentions cannot be verified, there are several reasons to look beyond the assumption that behavioral masculinization or feminization is something that trans people do intentionally (as claimed explicitly by Spencer 1988, among others). Chapter 4 explains that the language ideologies my participants articulate in metalinguistic commentary emphasize the pitch change brought about by testosterone while erasing other potential indices of gender in the voice. A high value is placed on speaking in a way that feels authentic, yet testosterone is not seen as a threat to that authenticity. Aside from average pitch, my speakers also sometimes spoke about pitch variation and “up-talk” (rising intonation in declaratives) as non-biologically driven habits that are associated with gender difference; however, they did not seem to be aware of non-pitch based gender differences in the voice, and specifically were not consciously aware of gender differences in formant frequencies or [s]. Of course, the fact that community ideologies disavow self-conscious masculinization does not mean that self-conscious masculinization isn’t happening – particularly in the context of read speech. Nor does the fact that speakers lack conscious awareness of the phonetic variables that might be subject to masculinization mean that these features aren’t nevertheless drawn on when speakers take on a task like “speaking in a more masculine way.” It is entirely plausible, then, that speakers are in some way or to some degree choosing to use more masculine phonetic styles. But there are other possibilities as well: possibilities that capture the complex social processes through which gendered ways of speaking are acquired.

Because testosterone and vocal pitch occupy such a focal point in discussions of transmasculine voices, let us begin there. Based on the evidence from both trans and non-trans speakers, we can deduce that testosterone plays an important role in increasing mass in the vocal folds and/or laryngeal cartilage. None of the participants in this study felt that they could achieve a male-sounding voice before testosterone; in fact, it is a common experience among transmasculine people who are not on testosterone,

or whose voices have not yet changed significantly, to be perceived as men based on visual cues, only to have this perception consistently reversed by a female-sounding voice. Achieving a lower vocal pitch is a transformational experience for many transmasculine people, and I do not want to minimize its effects. At the same time, we need to recognize that hormone-related changes in the body are filtered through particular forms of embodied practice: a relationship that has been emphasized in the burgeoning interdisciplinary study of *somatechnics*. Sullivan and Murray (2009) describe the concept of somatechnics as “an attempt to highlight the inextricability of soma and techné, of ‘the body’ (as a culturally intelligible construct) and the techniques (*dispositifs* and ‘hard technologies’) in and through which corporealities are formed and transformed” (p. 3). We can draw on this framework to help us understand the somatechnics of testosterone. I argue that transmasculine voices, though shaped by hormones, are thoroughly embedded in speakers’ **use** of their available pitch range. Even the choice to go on testosterone, when to do so, what dose to begin with and whether and when to increase that dose, are all driven by transitioners’ social realities. Because vocal pitch is driven by somatechnic processes, it would be foolish to attempt to draw a firm line between phonetic changes caused by testosterone and those brought about by social processes, (just as Butler cautioned). Nor can we take the observed F0 values from chapter 5 as a direct representation of how much physiological change has occurred. However, one can certainly observe that speakers in this study are tapping into a significantly lower F0 range over time while engaging in the task of reading a passage into a microphone, and that this downward movement is not happening in a uniform way across these speakers. There are several levels of variation here, including speakers’ starting and ending points, the amount of change that occurs for them, and how quickly those changes happen.

As I have discussed, Mack stands out as the speaker whose final mean F0 was higher than any other speakers starting mean F0. He was also the only speaker in the longitudinal portion of this study to tell me he was disappointed that his voice had not changed more, though he expects that his voice will continue to drop as he moves into his third year on testosterone. The slow speed at which Mack’s voice has changed can be explained in part through his stated desire to have a slow physical transition, beginning with a low dose of testosterone that he increased very gradually, with the thought that it would

make his transition easier on his son. This desire, however, does not completely undo the frustration Mack sometimes feels about his voice. He also believes that his age at the start of his transition (45) has impeded his hormonal transition, which I heard from several other men transitioning in their 40s or later as well. It is commonly repeated wisdom in transmasculine communities that older trans men tend to undergo less noticeable changes from testosterone compared to those who start hormone therapy earlier in life, though there is not universal agreement on this generalization. Physiological changes that occur in the aging process may affect the voice, particularly given that cartilage calcifies with age, which could interfere with testosterone's ability to enlarge the laryngeal cartilage. Yet age may matter in another way: perhaps speakers who have spent several decades living in a female gender role and employing a female-sounding voice (though not necessarily a normatively feminine voice) have ingrained articulatory habits that are less easily changed than those of younger speakers.

In fact, there is reason to believe that Mack is not physiologically constrained to the pitch range he uses during his read speech. During our final recording session, I asked Mack to read a set of sentences, and then asked him to read them again using the lowest-pitched voice he could manage without causing himself physical discomfort. On this occasion, Mack's mean F0 for the tokens I measured from the Rainbow Passage was 197 Hz. Figure 6.1 shows the pitch contour Mack produced for one of these sentences during his first reading, in which he was given no special instructions: "There are more than two factors here." Figure 6.2 shows the same sentence during his low pitched production.

Figure 6.1: F0 contour for Mack’s first production of the sentence “There are more than two factors here” (unmarked voice)

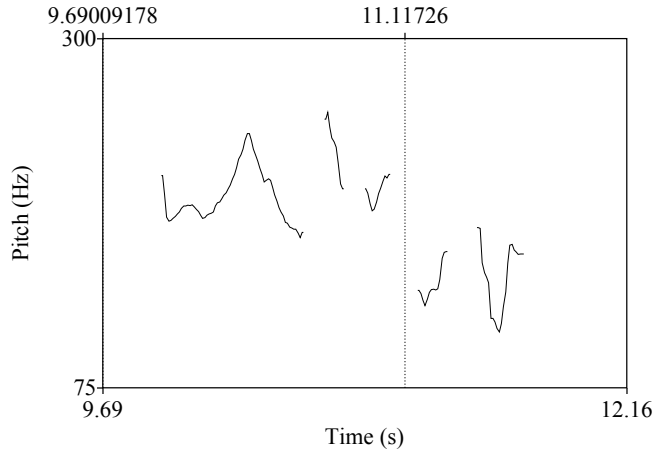
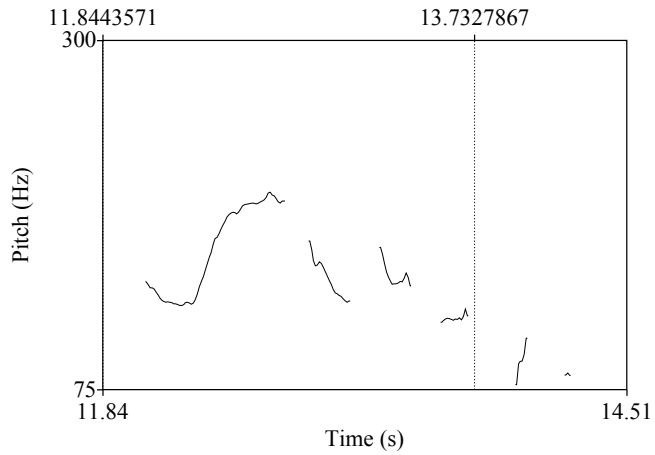


Figure 6.2: F0 contour for Mack’s second production of “There are more than two factors here” (lowest pitch voice)



If we exclude the last two syllables of this sentence, which were produced in creaky voice in the second, lower pitched reading, the overall mean F0 for the sentence in the first reading was 202 Hz, with a

maximum of 254 Hz and a minimum of 172 Hz. The second reading had a mean of 155 Hz, a maximum of 203 Hz and a minimum of 118 Hz. Mack is clearly physiologically capable of producing speech with a much lower F0 than he typically used during recordings of the Rainbow Passage, but he described feeling strange using this low pitched voice. He thought it sounded unnatural, as if it were obvious that he was consciously lowering his voice, though it sounded entirely natural (if slow and precise) to me and to several other linguists I informally polled. Mack told me he could not imagine actually using this voice on a regular basis, because he didn't sound like himself. This perspective aligns with the valuation of gendered authenticity that I discussed in chapter 4. Fascinatingly, the speaker in Papp (2011) who showed the least amount of change in F0 similarly reported thinking he "sounded weird" using the lowest part of his pitch range (p. 64).

In contrast with Mack, some of the transmasculine people I recorded were surprised to find that their voices changed more rapidly or more drastically than they expected. Pol and Devin both fall into this category, as genderqueer transmasculine people who both hoped to achieve greater androgyny with testosterone, rather than a strictly male appearance. Devin, who had the biggest downward change in F0 of the 10 speakers I analyzed over time, started out with the "full" dose of testosterone; Pol, however, maintained a low dose throughout his first year on testosterone, after which he decided to stop taking testosterone for the time being. Despite their surprise, neither Devin nor Pol felt their voices had changed too much. In fact, even while Pol's mean F0 was 132 Hz in his final reading of the Rainbow Passage, he said that he was still consistently perceived as female both on the phone and in face-to-face interactions at that time. This is no doubt in part because Pol expresses his identity as a genderqueer trans boy by visibly and audibly disaligning with hegemonic masculinity. In addition to a relatively high-frequency [s], compared to other participants in this project, Pol has a queer masculine aesthetic that he describes as that of a "dandy." In contrast to my usual fieldwork uniform of jeans, t-shirt, and a hooded sweatshirt, I usually saw Pol looking dapper in some sort of attractive collared shirt and sweater combination, perhaps in pastels or an argyle pattern. It is also possible that Pol's accent, which is influenced by the dialect of his Cornwall-born mother, influences the way his voice is perceived in American contexts. In my future work

on the perception of these speakers, I plan to investigate whether speakers of British English might perceive Pol's voice differently than American English speakers. Just as Pol's nationality is undoubtedly an important aspect of understanding his F0, Carl's ethnicity may be part of what distinguishes him from the other speakers in the study, who have a much lower mean F0 – Carl's final mean F0 was the second highest at 160 Hz. As I mentioned above, it is difficult to know how Carl being Filipino might influence his voice, if it does, but it is certainly one thing that sets him apart from the other speakers. At the same time, I introduce a gender-driven argument for Carl's upward shift in the acoustic characteristics of [s] that is potentially distinct from ethno-racial identity.

One of the most common questions posed to me by members of the trans community is what effect testosterone dose has on the way an individual's voice will change. I do not have a large enough sample size to draw definitive conclusions about this factor, but I can make a few observations. First, a low dose does not guarantee a small change in pitch, compared to a higher dose. Table 2 shows each speaker's starting and maximum dose, along with the range between their highest and lowest means for F0. Note that many of these speakers' initial recording, which usually provides their highest pitch point, comes from a time when their voice had already changed to some degree. As a result, the difference between the highest and lowest mean F0 values decreases with speakers listed toward the end of this table, who had been on testosterone longer than the speakers at the beginning of the table. Nevertheless, we can see that some speakers who maintained a low dose – like Pol, Elvis, and James – nevertheless had large changes in F0 and ended up with very low means for F0 (132 Hz, 121 Hz, and 113 Hz, respectively). At the same time, a full dose does not necessarily lead to greater changes in F0. For instance, Adam and Tony started out with comparable means for F0 (169 Hz versus 170 Hz), yet at the end of their first year of testosterone Tony had a mean F0 of 114 Hz, while Adam was slightly higher at 126 Hz despite the fact that Adam began at a full dose of 100mg per week, while Tony worked up slowly

Table 6.2: Speakers' highest and lowest means for F0 with testosterone dose (10 longitudinal participants only)

<u>Speaker</u>	<u>Highest F0</u>	<u>Lowest F0</u>	<u>Difference</u>	<u>Starting testosterone dose</u>	<u>Testosterone dose at last recording</u>
Adam	169 Hz (0 weeks)	126 Hz (47 weeks)	43 Hz	100mg/week	100mg/week
Pol	186 Hz (8 weeks)	132 Hz (42 weeks)	54 Hz	25mg/week	25mg/week
Tony	170 Hz (3 weeks)	114 Hz (40 weeks)	56 Hz	25mg/week	100mg/week
Elvis	145 Hz (12 weeks)	121 Hz (28 weeks)	24 Hz	25mg/week	60mg/week
Devin	172 Hz (8 weeks)	106 Hz (52 weeks)	66 Hz	100mg/week	60mg/week
Carl	175 Hz (16 weeks)	141 Hz (31 weeks)	34 Hz	50mg/week	75mg/week
Kyle	158 Hz (19 weeks)	110 Hz (72 weeks)	48 Hz	100mg/week	100mg/week
James	123 Hz (25 weeks)	113 Hz (87 weeks)	10 Hz	50mg/week	50mg/week
Mack	220 Hz (46 weeks)	168 Hz (74 weeks)	52 Hz	50mg/week	84mg/week
Dave	136 Hz (97 weeks)	111 Hz (76 weeks)	26 Hz	50mg/week	90mg/week

from 25mg to 100mg over the course of six months. Moreover, Pol never increased his dose from his initial 25mg per week, yet achieved a similar degree of change to Tony (i.e. a bit larger than Adam's). Contrary to the argument made by Constansis (2008), I found no evidence of the voice quality he calls "entrapped FTM voice" (in reference to a distinctively trans-sounding voice type that community members sometimes talk about as "tranny voice") among these speakers. Constansis postulates that starting hormonal transition at a full dose of testosterone causes this voice quality, though he doesn't explain the mechanism that would result in this link. These data do not support his argument.

Even as biology is implicated in terms of the pitch range to which speakers have access, we cannot consider pitch without thinking about social forces. Factors like age, dialect, and testosterone dose

may be influential, but it is equally important to consider speakers' variable relationships with masculinity. First and foremost, we need to ask what kinds of linguistic styles these individuals want to embody. To answer this question, we can look to speakers' gender assignment, gender role, gender identity, gender presentation, and sexuality. In response to the changes in available F0 range brought about by testosterone, speakers are left to figure out what part of that range they want to use based on both the image they hope to project as well as their comfort using a voice that sounds different from the one that is familiar to them from their pre-transitional lives.

Unlike fundamental frequency, changes in these speakers' formant frequencies provide less evidence for a hormonal influence. As a reminder, the three most frequently invoked explanations for gender differences in formants include: 1) men tend to have longer vocal tracts than women because men's bodies are bigger than women's, 2) men have longer vocal tracts because testosterone causes the larynx to descend as well as enlarge, and 3) men have longer vocal tracts because they learn to physically manipulate them to be longer than they might otherwise be. Of course, these are not mutually exclusive theories, but in chapter 2 I argued that there is strong evidence for the third option, regardless of whether the first and/or second possibilities are also true.

As I described in chapter 5, there was an overall negative correlation among these speakers between formant frequencies and time on testosterone, even though I did not capture any significant changes in real time among any one speaker. Several speakers did have downward trends in formant frequencies, including Adam ($B = -0.9555$, $p < 0.067$), Devin ($B = -1.142$, $p < 0.027$), and James ($B = -0.982$, $p < 0.052$), but none were significant at the 0.5% confidence level. When individual formants were considered, the speakers as a whole showed a negative relationship between F1 and time on testosterone, no correlation between F2 and time on testosterone, and a positive relationship between F3 and weeks on testosterone, indicating that F1 fell but F3 rose. I mentioned when I presented these findings that it is difficult to find a specific motivation for increase in F3 (though see below for my explanation of Carl and Mack's increases in the frequency profile of [s]), but it is also difficult to ignore given that it has now been documented in the other major study of trans men's formants (Papp 2011). However, the point I

want to make is that the observed changes in formant frequencies among these speakers can be explained more easily articulatorily than biologically. Were we observing a biologically-motivated process, in which the vocal tract was enlarging, we would expect to see more consistent changes across the formants, rather than uneven changes in just one or two. We would also expect to see more consistency across speakers, when in fact some speakers had no apparent correlation between formants and time on testosterone while others did have movement in formants even if they did not reach statistical significance. Carl stands out in the case of formants just as he does for [s] as the only speaker whose correlation between formants and time on testosterone was a positive one instead of a negative one.

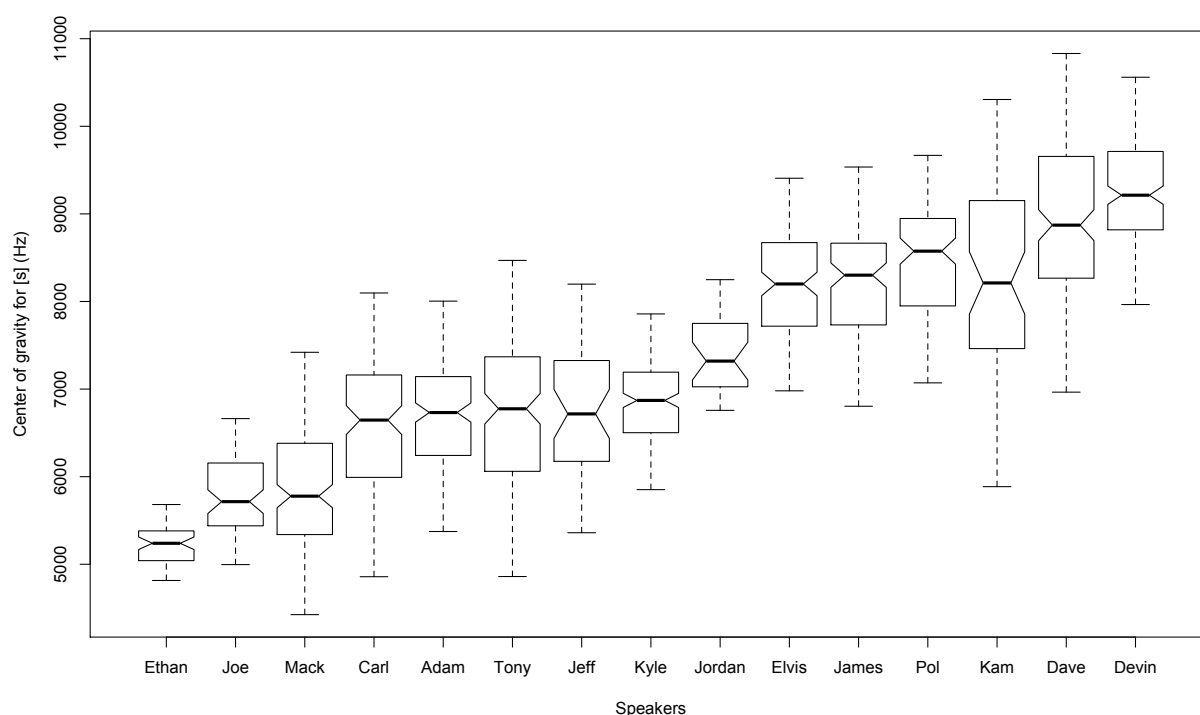
When we think about social influences on formant frequencies, the first place we need to look is childhood language socialization. Prepubescent children have been shown to produce formants that follow the same gendered patterns that appear among adults, indicating that young speakers learn to produce gender-“appropriate” formant frequencies before biology might affect their vocal tract length. The same applies to gendered productions of [s], which appear to have no connection to sexual physiology. Socialization early in life is driven by gender assignment, in that people assigned to a female gender role tend to be held to a particular set of expectations about normative gendered behavior; though what those expectations are, exactly, varies enormously across communities. Gender assignment has a huge influence on the socialization experiences of any individual, but it does not alone determine how socialization will proceed. It is useful to talk about assignment here because it isn’t necessarily the case that transmasculine people self-identified as female during childhood, or had a feminine gender presentation, even though they were perceived as girls by people around them. Socialization is not a passive process, in which adults (or other experienced actors) transmit information to children (or other novices), which is then accepted whole-cloth and put into action by the recipient (Schieffelin & Ochs 1986, Ochs & Schieffelin 2008). The stances taken up by the socializee also have an important effect on how socialization proceeds. In this case, it is important to know that transmasculine people have an array of gendered backgrounds. Some, like Joe, Tony, and Adam, have a lifetime of masculine gender expression behind them, and may have even started thinking of themselves as male, or at least masculine,

long before they articulated that feeling to others. Elvis, on the other hand, told me that he had a feminine gender presentation before his transition, which became more masculine as he progressed through his transition. Those who have always seen themselves as masculine typically report actively resisting femininity in childhood, with fights over clothing choices being the most common topic of stories on this issue. But this is not a universal experience, and some of my participants told me they accepted or even happily embraced femininity as children. An interesting account of this sort came from Devin, who maintained a genderqueer identity even as his gender presentation shifted from a more androgynous mixture of masculine and feminine to a more perceptibly masculine style – both linguistically and in terms of visual semiotics. During one of our first conversations, Devin recalled that as a child he felt his voice was not feminine enough and that he should work harder to sound like other girls. In retrospect, he felt that this effort may have worked against him, as he described his voice before testosterone as very feminine. Indeed, despite a great deal of masculinization in his voice, a friend described him as sounding “like a woman with a really deep voice” after about a year on testosterone. Devin says he did not take this as an insult, though some of the male-identified transmasculine people in this study would.

Childhood language socialization is also somewhat useful for understanding the range of [s] productions we find among these transmasculine speakers. Figure 6.3 reproduces the data presented in Figure 5.6, which shows center of gravity for all 15 of the speakers appearing in Table 6.1. Speakers have been reordered here, however, from lowest to highest mean center of gravity. As in chapter 5, the notches on each box indicate which speakers are significantly different from one another. Recall that Flipsen and colleagues (1999) found that English-speaking men tend to produce [s] with a center of gravity in the range of 4,000–7,000 Hz, while women have been reported to have centers of gravity in the range of 6,500–8,100 Hz. Relative to these reported ranges, most speakers have centers of gravity that are within or even above the values reported for women, though several of these were in the 6,500–7,000 Hz range, where men’s and women’s productions overlap. Considering the evidence that gender differences in [s] are also acquired early in life, it is not surprising that some transmasculine people would produce this

sound in keeping with norms for their assigned gender. Notably, Devin has the highest mean center of gravity of any speaker.

Figure 6.3: Center of gravity for all 15 speakers, ordered from highest to lowest mean COG



In addition to being an interactive process between socializers and socializees, socialization is a project that continues throughout the lifetime. Most research on the ways language socialization affects the gendered voice only discuss childhood language socialization. This focus on children as speakers is useful because of its potential power to unseat biological essentialism in phonetic accounts of the gendered voice. Yet sociocultural linguists examining other forms of language socialization have shown that adulthood, too, is a time for learning how to take on new personae and identities – often in professional or educational settings (Jacobs-Huey 2006; Jacoby & Gonzales 1991) or in the adoption of other kinds of roles and identities related to religion (e.g. Fader 2006), citizenship (e.g. Duff et al. 2000), illness (e.g. Capps & Ochs 1995) and so on. Some of this work has further considered the socialization of

new adulthood identities related to sexuality (e.g. Peebles 2004, Leap 1999) and gender (e.g. Hall & O'Donovan 1996). This research indicates that gendered language socialization, which often comes in the form of bluntly delivered evaluations for trans people in transition – for instance, Devin's friend's assessment that he sounds “like a woman with a really deep voice” – is not a kids-only affair. Trans people whose phonetic styles are changing may be seen as especially open for socialization in the form of unmitigated commentary because of the salience of the changes as well as the assumption that trans people want to “pass” (i.e. to be read as non-trans members of their self-identified gender) and desire feedback on their “passability” (see Gardner's 1980 analysis of the street harassment of women for the notion that some gendered social actors are treated as open for commentary).⁵²

However, there are lessons to be taken from a related body of literature in which sociolinguists have considered the process of second dialect acquisition. For example, Payne (1980) examines the acquisition of Philadelphia's accent system⁵³ among groups of children who were either native Philadelphians or transplants from another area. Payne's work is among the classic studies to show that children tend to acquire the dialect of their peers rather than that of their parents. However, she also found that children who moved to Philadelphia during the first few years of life did not fully acquire the local pronunciations for the variables she investigated. Even those who were born in Philadelphia showed different degrees of acquisition depending on whether their parents were local; those with parents also born in Philadelphia were the only group to acquire the complete local phonological system. Similarly, Tagliamonte and Molfenter (2007) investigate the changes occurring for three children who moved from Canada to England. Despite the fact that all of the children were under age five at the time of their move

⁵² During a conversation with a fellow researcher working in local trans communities, I was surprised to find my own ability to “pass” suddenly the subject of praise from my non-trans colleague. The comment did not surprise me because I was unaware that I do not fit into many people's ideas about what trans people look like, but because even in a decidedly professional context in which my physical appearance presumably had no relevance, I continue to find myself and my gendered realness the object of others' assessment by simple virtue of being trans.

⁵³ More specifically, Payne examined the “short-a split” in Philadelphia, which is a lexical split. That is, certain words that contain a “short a” (i.e. [æ]) are produced with a raised [æ], while others are not, and the pattern must be learned on a word-by-word basis instead of being determined by a generalized rule. This is different from the Northern Cities Shift, for instance, where [æ] is raised across-the-board.

to the UK, Tagliamonte and Molfenter find that only the youngest of the three used British variants (e.g. a glottal stop for [t]) as often as UK-born children. Even after 6 years, the two slightly older speakers still did not use a completely native UK English phonology. Findings from these studies suggest that dialects might be subject to the same kind of learning limits that languages are thought to be; that is, after a certain age it appears to be difficult if not impossible to fully acquire a new dialect.

On the other hand, recent sociolinguistic research has begun to document changes in the voice that occur over the course of the lifespan. Most sociolinguistic studies of language change have taken an “apparent time” approach – that is, an age-stratified sample is used to give a sense of how language has changed over time. For example, if a particular pronunciation is more and more common among younger speakers, we could argue that a change in progress is taking place, with the older speakers representing an older pronunciation system while younger speakers reflect new innovations in the sound system. The assumption underlying this approach is that people’s speech in adulthood reflects the language they were exposed to at a much earlier point in their lives. The “apparent time” perspective contrasts with studies of “real time” change, which are longitudinal investigations of the same speakers over time. Sankoff and Blondeau (2007) compares these types of analysis – apparent versus real time – in their investigation of changes in /r/ in Québécois French. Although they find evidence of a generational shift in their apparent time analysis, they also show that individuals sometimes also engage in huge shifts over the course of their lifetimes. Harrington (2006) similarly presents a study of how Queen Elizabeth’s pronunciation has shifted from the posh accent known as Received Pronunciation to that of a more typical standard variety he refers to as Estuary English. My own study adds to this body of research by considering the ways that the gendered characteristics of the voice, too, may change over the lifetime, despite being heavily shaped by early life experiences.

As transmasculine people begin to transition into a male gender role, and are perceived as men in their daily lives (whether or not they identify as such), a new set of pressures is exerted upon them: the demands of hegemonic masculinity (Connell 1995, Connell & Messerschmidt 2005). Despite the degree of pride community members take in their authenticity, transmasculine people do not universally resist

the pull of gender normativity. Particularly for those whose acceptance as masculine and/or men is tenuous, taking on more normatively masculine characteristics can help ensure that they are perceived the way they wish (see chapter 4). Enacting more normative forms of masculinity can also be a way to protect against the dangers that are visited upon men with stigmatized gender presentations, which is something my participants were clearly aware of. In Chapter 4, I quoted Kam telling me that he “never bothered or cared to learn male speech patterns,” but I often heard about my participants’ process of learning about other kinds of gender-linked interactional practices – expectations for how men interact in gendered public spaces like restrooms and locker rooms; ways to avoid being threatening to women walking alone at night; or the process of negotiating potentially violent interactions with other men. Though I cannot claim to measure the effects of these socializing experiences on the voice directly in the context of this study, it is clear that some flexibility exists among these speakers when it comes to acoustic measures like [s] and, perhaps, formant frequencies. We can also see from the inter-speaker variation in this sample of speakers that people who were raised in a female gender role do not necessarily take on the gendered phonetic styles that reflect their gender assignment. We should be careful, then, not to use socialization as a deterministic stand-in for biology.

Continuing with this focus on center of gravity for [s], we can see that language socialization based on speakers’ assigned, or current, gender role fails to explain all of the variation represented in Figure 6.3. For speakers like Ethan, Joe, and Mack – with the three lowest means for center of gravity – the fact that they are the only participants to identify as straight men is undoubtedly significant. These three men – who are all white, in their 40s, and either come from working class families (in the case of Ethan and Joe) or currently work in blue collar occupations (Mack, a bus driver) – enact fairly conventional forms of masculinity and are most comfortable being identified as men (though Mack also identifies as a trans man, see Excerpt 6.2 above). With mean centers of gravity below 6,000 Hz, these individuals are well within the norms for men’s center of gravity based on the range I quoted above of 4,000-7,000 Hz. The next group of speakers, whose center of gravity falls into the range where men’s and women’s reported productions overlap (6,500-7,000 Hz), can also be distinguished in terms of identity.

While Ethan, Joe, and Mack self-identify as straight men, the speakers in the middle group – Carl, Adam, Tony, Jeff, Kyle, and Jordan⁵⁴ – identify as queer, and prefer the label *trans man* to *man*. For Jeff, the label *queer* refers to his attraction to people with certain types of “energy,” regardless of gender, but for the others it is a label that they apply primarily to their relationships with women. Most of these queer trans men have quite masculine gender presentations, as well, compared to some of the speakers I will discuss momentarily. Kyle, however, enjoys blending markers of queer masculinity (e.g. he says likes to “get cute” along with his female partner before they go to the club, referring to his choice of clothing, hairstyle, and even makeup) with his outdoorsiness and increasingly athletic lifestyle. In fact, the trans men like Kyle who prize their affiliation with queer and distinctively transmasculine identities (also Carl, Adam, Tony, and Jeff) all expressed concern that they would be mistaken for straight non-trans men, leaving them with a sense of invisibility even within the queer community (Green 1999). As I mentioned in section 6.2, *queer* as an identity label did some work to combat that loss of visibility, though the primary tactic of visibility was to maintain an openly trans identity across their various communities. The results in Figure 6.3 show that [s] is, analogously, a phonetic resource that trans speakers can draw on in distinguishing themselves from straight men like Mack, Joe, and Ethan.

Those who do not identify as men or trans men, and instead describe themselves with labels like *boy* and *genderqueer* (or avoid labels all together), have significantly higher centers of gravity than the other two groups I have just discussed. This includes Elvis, James, Pol, Kam, and Devin. In fact, several of these speakers’ mean center of gravity is beyond even the upper end of the range reported for women by Flipsen et al (8,100 Hz). All of these individuals actively distance themselves from hegemonic masculinity, linguistically and otherwise. This is evident in their non-normative gender expressions which they describe with words like *dandy*, *queer*, *genderqueer*, *glittery* and *androgynous* and involve more

⁵⁴ Interestingly, Jordan’s productions of [s] put him between the group of queer trans men and the group of non-binary-identified individuals that includes Elvis, James, Pol, Kam, and Devin. This neatly reflects the fact that I was only able to record Jordan twice, at the very start of his transition, during a time that he said he was moving away from a butch identity and toward stronger self-identification as a trans man, as well as shifting his gender presentation from a more typically masculine one to be more inclusive of femme gender expression, which I was able to see when he later returned to the Bay Area.

incorporation of markedly feminine signifiers like Elvis' turquoise jewelry, James' penchant for glitter, or Kam's lack of interest in binding his chest.

This leaves Dave, who returns once more to again demonstrate that gender identity and gender presentation are distinct and both crucially important. Dave does not identify as genderqueer, but he is the only male-identified speaker in this group who also describes his gender presentation with words like *fem*. Without a doubt, the gendered characteristics of his voice partially constitute his flamboyantly non-normative take on masculinity (he mentions Oscar Wilde as a role model), including his high frequency [s] and his use of intonation patterns that he calls "swoopy." Dave's status as the speaker with the second highest overall mean center of gravity among these speakers reflects his (fem) gender presentation rather than his (male) gender identity. Sexuality-based identities may be important here, too, as all of the speakers with the highest centers of gravity (Elvis, James, Pol, Kam, Dave, and Devin) are either attracted to a variety of genders or attracted primarily to men. In his talk about his identity, Dave affiliates himself more intensely with queer non-trans men than with the kinds of distinctive transmasculine identities we saw from speakers like Carl, Adam, and Tony.

It is important to also acknowledge the changes some speakers underwent in gender identity, gender presentation, and sexuality, which is not unusual for trans people who are in the early stages of a transition process. These changes included both movement toward and away from hetero- and gender-normative masculinities. Elvis described himself as "playing with gender" when we first met, and was unsure about whether he wanted to continue on testosterone for the first several months of hormone treatments – an uncertainty shared by Pol, who ended up stopping his hormone treatments after about a year.⁵⁵ A year later, though, Elvis had settled on a more consistently masculine presentation and was confident that testosterone was right for him. Devin similarly went from a visibly genderqueer presentation to a more conventionally masculine style (for instance, trading his longer, somewhat punk,

⁵⁵ The prototypical approach to hormone therapy is a lifetime treatment regimen. However, people choose to go off testosterone for many reasons. As I mentioned earlier, Dave was concerned about avoiding baldness and certain other potential effects of testosterone. In Pol's case, he no longer felt the need to be on testosterone when he decided to have chest surgery and realized he didn't need to be on hormones to pursue that desire.

androgynous hairstyle for an unmistakably masculine short buzzed cut). At the same time, though, Devin began to identify more strongly with gay and queer men by virtue of his growing attraction to them; that is, even as he affiliated more strongly with masculinity, it was not necessarily a form of hegemonic masculinity that he desired for himself or in others. Kyle, too, felt greater and greater solidity in his self-identification as a man the longer I knew him (as opposed to genderqueer, which was the label he used before he began his medical transition process), but also found himself embracing his “feminine side” once he felt his ability to be recognized by others as a man was no longer at risk.

In fact, it is with respect to sexuality that I can offer a tentative explanation for Devin’s rather unexpected change in [s]. Devin was the only speaker to reach a statistically significant negative correlation between center of gravity of [s] and weeks on testosterone. Despite the fact that his center of gravity dropped from an average of 9459 Hz at his first recording to 8779 Hz at his final recording (which is still quite high), Devin had an decrease in skew. This means that, once the downward change in the mean frequency for [s] was accounted for, he had greater acoustic energy in the higher frequencies in [s] relative to the lower ones. One possibility for this apparent contradiction is that it is simply an artifact of the process by which Devin changed his production of [s]. That is, Devin may have shifted his articulation in a way that lowered mean frequency but did not uniformly lower the entire frequency range, resulting in a change in skew. Another possibility is that Devin is picking up on the association I have mentioned between skew and sexuality among men. I discussed in chapter 2 the fact that more than one study (Munson et al. 2006, Munson 2007, Zimman under review) has found the spectral skew of [s] to be a significant predictor of perceived sexual orientation among male speakers. According to Munson, as well as my own analysis of gay- and straight-sounding trans and cis men, having a higher mean frequency does not correlate with perceived gayness in experimental contexts, but having a more negative skew does. If Devin is simultaneously moving his center of gravity lower and moving his skew toward the higher frequency, he may be producing [s] in a way that reflects his developing gay identity. Further investigation would be helpful to consider whether Devin’s [s] now comes closer to the way [s] is produced by the gay and queer men with whom he now identifies and forms relationships.

Devin was not alone in having a negative correlation between center of gravity and [s] – Adam, Tony, and to some degree Pol showed similar trends – however, Devin was the only speaker whose downward change in this variable reached a *p* level less than 0.005. However, two other speakers had a significant change toward a higher frequency [s] rather than a lower one. For Carl, this involved a statistically significant positive correlation between center of gravity and time on testosterone, while for Mack it involved a negative correlation between skew and time on testosterone. Unfortunately, I do not have recordings of either of these trans men before they began testosterone, making it difficult to deduce the overall trajectory of their phonetic change; but there are a few important facts that can be invoked to help us understand these counter-intuitive findings. The first is that changes in gender presentation happen in both directions. Carl’s higher frequency [s] – and his (not quite significant) positive correlation between formant frequencies and time on testosterone – went along with a move toward a less normatively masculine gender presentation. Carl is a queer, 21 year old, middle-class Filipino trans man who recently graduated from a Bay Area university. When I first met him, he had a quite masculine gender presentation that took the form of slightly baggy jeans and t-shirts featuring video game logos and characters. As his transition progressed, however, Carl was vocal about feeling increasingly comfortable in expressing less typically masculine characteristics. Like many trans men, Carl found that being perceived as a man allowed him greater freedom in the kinds of masculinities he could enact without risk of undermining his recognition as a man. Toward the end of my fieldwork, Carl had started letting his hair grow longer and was wearing a wider range of clothing styles – fitted cut-off jeans stopping just below the knee, for example – than the more conventional masculine look he preferred when we first met. Instead of looking like a relatively gender normative (if somewhat nerdy, by his own estimation) teenage boy, Carl began looking more like a queer, somewhat bohemian young man who is unconcerned with hegemonic norms for men’s self-presentation. At the same time that Carl showed a significant increase in center of gravity – approximately halfway through our year of recordings – he also showed an increase in F0. Table 5.9 indicated that Carl’s mean F0 at one point dropped to 142 Hz, but just as his center of gravity became significantly higher, his F0 ascended back to approximately 160 Hz.

Those who did not experience this kind of visually salient shift in gender presentation nevertheless talked about doing less self-monitoring as they began to be perceived as men more often, which they applied to their voice as well as other gender signifiers. Mack fits into this category, as someone who maintained a strongly masculine gender presentation in terms of his clothing, haircut, bodily hexis, and so on. In chapter 4, I discussed the fact that a few trans men I recorded – including Mack – with had experimented with intentionally masculinizing their voices early on in their transition, but eventually gave up on those efforts because they proved futile, because the resulting voice didn't sound natural or feel comfortable, and/or because they had confidence that testosterone would eventually masculinize their voices and make self-conscious effort unnecessary. Mack, in particular, told me that the lower his voice got, the less he paid less attention to whether he was speaking in a normatively masculine way. As I quoted in chapter 4, Mack told me that he had “been lazy on some things because it's very easy to just go, well yeah, but in a year it's gonna be gone anyway, y'know, in a year my voice is gonna be deep anyway.” In this sense, it is not so surprising that Mack, like Carl, had a decrease in F0 at the same time that he had an increase in the frequencies in [s]. Having a low pitched voice affords more freedom when it comes to non-pitch-based indices of gender, a point that is the focus of the next and final section of this chapter.⁵⁶

6.4 Phonetic bricolage

Though masculinization was the overall trend across the read speech of transmasculine speakers in this study, Devin, Mack, and Carl underscore the fact that a gender role transition can potentially free up an individual to shift their relationship to gender in any number of directions. Wanting a male-sounding voice was the most common reason my participants gave for pursuing testosterone therapy, yet desire for a prototypically masculine voice was less common. Even when I asked straight-identified speakers like

⁵⁶ Papp (2011) similarly mentions the possibility that trans men who show an increase in pitch range and other gendered phonetic characteristics may do so because they no longer need to maintain the same degree of masculinity in their speaking styles as they begin to “pass” as men more and more often.

Mack and Ethan how they would feel if they were perceived as gay men, their responses stressed that they would not be too bothered so long as they were perceived as men of some sort.

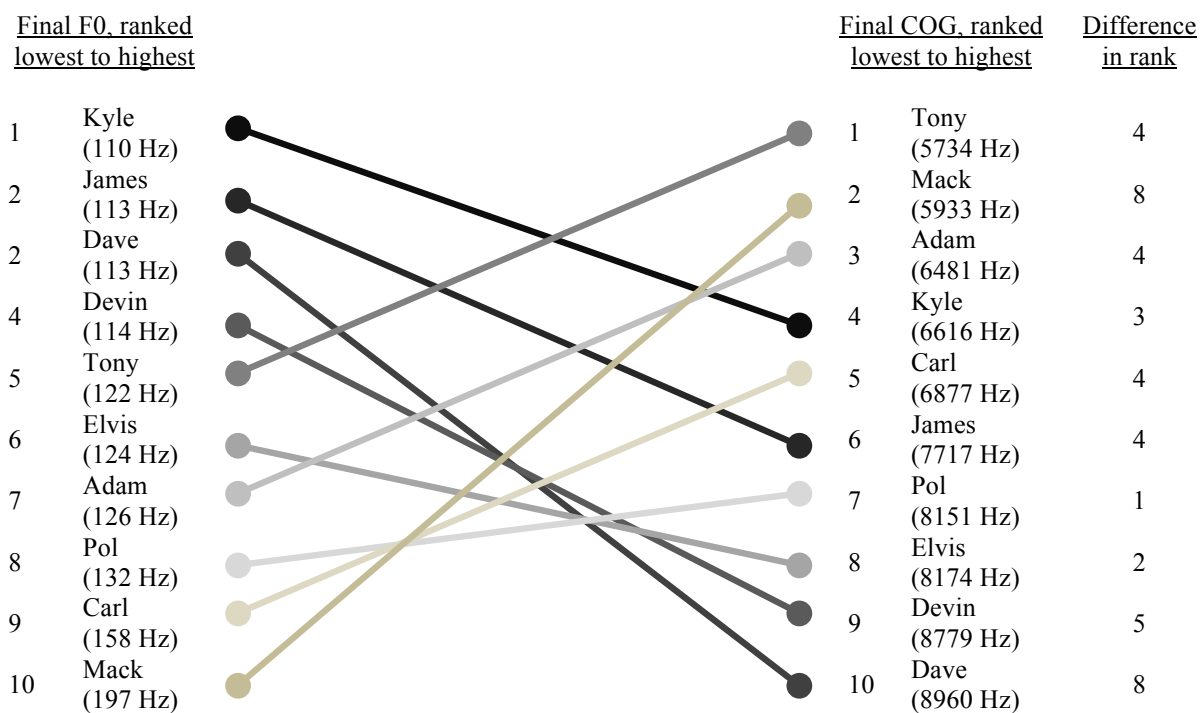
If having a male-sounding voice allows speakers to avoid working to masculinize other aspects of their linguistic styles, it is not simply because pitch is so much more important than other gender differences in the voice (though it may be, in some ways, more salient than other linguistic markers in the gender categorization process). Rather, it is because a change in fundamental frequency serves to recontextualize other gendered phonetic traits. The study of linguistic style in third wave sociolinguistics (Eckert 2005) has emphasized that socio-indexical meanings are not ascribed to single linguistic variables but to entire styles. Sociolinguists like Eckert (2000, 2004, 2008), Podesva et al. (2002), and Campbell-Kibler (2011) have drawn attention to the ways that even slightly different combinations of phonetic characteristics can take on entirely new sets of social meanings. That is, the meaning of a characteristic like a strongly aspirated released [t], or a high frequency [s], takes on different meanings depending on context, both social and linguistic. As Eckert (2004) has pointed out, the way linguistic styles are brought together with other socially meaningful semiotic cues can be seen as a type of *bricolage*. Hebdige's (1979) account of the way styles are constructed taps into Levi-Strauss' (1966) notion of bricolage as the improvised composition of cultural meaning from everyday resources. In the creation of new styles like those of punk youth observed by Hebdige in the 1970s, bricolage calls attention to the ways semiotic resources from disparate sources can be mobilized into an infinite number of potential combinations that exceed the meanings of their original component parts. As a result, linguistic variables take on very different kinds of indexical significance depending on their semiotic context – linguistic and otherwise.

The potency of phonetic bricolage means that a shift in one phonetic characteristic can potentially recontextualize the sociolinguistic meanings attached to the style as a whole. This is precisely what we see happening with transmasculine people on testosterone: with the development of a low-pitched voice, a high frequency [s] can go from indexing a kind of normative or even hyper-femininity to indexing a gay male identity, for instance (a perceptual shift supported by the findings in Zimman 2010, under review). If we embrace the importance of stylistic context, we may find ourselves less driven to identify the source of

each gendered speech characteristic, which itself depends on the unaccomplishable task of divorcing biology from culture. Instead, we might be compelled to ask, as I have in this chapter: are the variables in question fixed, or can they change? And provided that the three acoustic measures investigated in this study have shown themselves to be flexible, how can we explain the use of a particular characteristic in a speaker's current linguistic style? Dave may have learned to produce a high frequency [s] during childhood, for example, but identifying a source in this way does not tell us why he currently has one of the highest frequency [s]'s out of the speakers I analyzed. Crucially, it is my participants' self-articulated gender identities, presentations, and sexualities that serve as the best explanations for the variation we find on an inter- and intra-speaker basis even where biological forces are relevant, as with pitch. And these insights come without even beginning to explore the ways my speakers' gendered speaking styles surely differ across interactional contexts.

Three acoustic characteristics are not a complete review of these speakers' phonetic styles, but they do give us the ability to triangulate the changes (and non-changes) I observed and to think about each variable in relation to the others. The primary relationship I want to draw attention to, as my last point of analysis, is the one between pitch and the frequencies in [s]. Looking at only one characteristic or the other, we could reach certain conclusions about which speakers came closer to norms for masculine speech. In Table 6.3, I rank speakers according to their mean fundamental frequency and mean center of gravity for [s] as of their final recording. Lines between the columns connect speakers' rank in F0 to their rank in center of gravity.

Table 6.3: Speakers' means and rankings for F0 and center of gravity for [s]
(10 longitudinal participants as of their final recordings)



The most striking fact about Table 6.3 is that no one occupied the same rank for these two measures. The closest case is Pol, who had the 3rd highest F0 and 4th highest center of gravity. More frequently, there is a difference of 4 or more between a speaker's ranking for F0 and his ranking for center of gravity. The most striking distances are among Dave and Mack, who occupy opposite ends the spectrum. Mack, as I have mentioned, has the highest mean F0 of any speaker, but he also had the second lowest mean center of gravity for [s], which reflects his identity as a straight, gender normative (trans) man. By contrast, Dave has the highest center of gravity for [s] (based on the final recordings made with each speaker), but was tied for second lowest mean F0. Devin is another speaker with a low fundamental frequency and high center of gravity, with raw numbers similar to Dave's. Considering these two acoustic features together, it becomes much more difficult to describe any one of these speakers as sounding more or less masculine than the others: transmasculine subjects enact a range of masculinities, which are

reflected (and partly constituted) by combinations of linguistic variants that only become more complex as additional features are included.

Through the process of phonetic bricolage, transmasculine speakers draw on the linguistic resources available to them, whether driven by hormonal changes, childhood language socialization, or gendered habits learned later in life. Most crucially, the linguistic result of this creative process is one that works for speakers in the present moment. Not all transmasculine people are happy with their voices, nor is their agency unlimited – yet the participants in this study are able to construct styles that reflect their multi-faceted relationships with masculinity. The voices of transmasculine people are most fruitfully examined as constellations of linguistic features: as with gender and sexuality, a full understanding of linguistic style comes from considering the multiple layers that form these complex blends of social meaning.

6.5 Conclusion

This chapter has provided an account of the gendered phonetic styles employed by the transmasculine individuals I recorded during their first year or two on testosterone. I have argued for the importance of a complex intersection of forces, including physiological, socialization-based, and identity-driven processes. These processes, I have argued, can be best understood when framed as part of a multi-layered theory of gender, including assignment, role, identity, and presentation, along with more flexible understandings of biological sex and sexuality.

One of the primary points to take away from this chapter is that gendered phonetic styles are not determined by sex, nor by childhood socialization. Instead, they emerge from the process of weaving together these layers of gender, along with others. Transmasculine voices illustrate the tangible importance of both embodiment and language socialization in shaping the gendered voice. But if we turn to the distinctions between gender assignment, role, identity, and presentation, we find that the body and the socialized self are both more flexible than deterministic theories of the phonetic gender differences would lead us to believe. A second conclusion of this chapter is that transmasculine people occupy a

range of gendered positionalities that do not necessarily line up in any predictable way. Rather than being a sign of successful or unsuccessful masculinization, the gendered characteristics combined in a voice like Mack's, Devin's, or Dave's is a reflection of the speaker's complex relationship to categories like *male*, *man*, and *masculinity*. Beyond that, these individuals' voices not only reflect but also partially **constitute** their relationships with masculinity. Third, I have argued that phonetic bricolage is the most useful way to theorize the phonetic changes that occur – and don't occur – among transmasculine people on testosterone and in transition. I have drawn on Butler's argument that any attempt to separate biology from culture is itself an inescapably cultural act, which has led me away from the classifying certain phonetic changes as driven by hormonal changes and others as socially motivated. Even if we know for certain that a phonetic feature can be traced back to childhood language socialization, we must look further to understand why it remains in a speaker's linguistic repertoire. Furthermore, we must consider the phonetic styles of transmasculine speakers as cohesive wholes in order to understand the use of individual variables. Given the complexities of sex, gender, sexuality, and phonetic style, binary coding systems that assign a single gender marker (or even a gender marker along with a sexuality-based identity) based on speakers' assigned sex or current gender role are insufficiently complex in the face of the real variation that exists in the world. Even typologies of transmasculine subjectivities, like the ones presented by Hansbury (2005) and Devor (2004), oversimplify the potential combinations of normative and non-normative expressions of transmasculine identities.

Are any of the masculinities I have discussed in this dissertation new or unique? Perhaps so, perhaps not. But the path through which they are acquired is clearly unconventional: these are masculinities that carry the traces of a female gender assignment, of varied histories of gender presentations, and of self-defined identities that may or may not seem to align with semiotic expressions of gender. This chapter has provided linguistic evidence for the importance of this multi-faceted framework of gender for interpreting the changing voices of transmasculine speakers. However, I expect that gender assignment, role, presentation, and identity can help us understand the fluid, interlocking,

ever-moving parts that constitute gender as a social system, whether or not the speakers in focus are engaged with the divide that separate women from men.

By focusing on trans masculinities and transmasculine voices, this chapter has also added to our understanding of the boundaries and diversity that characterize masculinity. We have seen through these speakers how masculinity can stake its claim in any one of several domains – gender assignment, role, presentation, or identity. When we recognize the ways that these elements of gender can be detached from each other and rearranged, fem masculinities become intelligible and a wider range of subjects can be included within our notions of the masculine.

In the final chapter of this dissertation, I summarize the findings and significance of my study, as well as discussing some of the limitations of this work. I also sketch plans for future development of the rich body of data I collected during my fieldwork.

CHAPTER 7

CONCLUSION

This dissertation has considered the relationship between gender and the voice in a group of 15 transmasculine people from the San Francisco Bay Area. I have joined a growing segment of sociocultural linguists who combine the methods of ethnography and sociophonetics in order to consider how social context informs variation in phonetic style. I tracked changes in three acoustic variables – fundamental frequency, formant frequencies, and the acoustic profile of [s] – over the course of 10 speakers' first or second year of testosterone therapy, on the basis of repeated readings of the same passage. However, I do not treat read speech as representative of how my speakers talk in other contexts, but rather treat their engagement with this genre as an opportunity for them to perform, in a relatively self-conscious way, a gendered speaking style that projects their affiliations with various types of masculinities.

All 10 speakers whose voices I analyzed on a longitudinal basis underwent a drop in fundamental frequency within the early stages of testosterone therapy, although two of these individuals who had been on testosterone for several weeks or months when I began recording them had apparently already completed much of that change. As a result, their voices were already within the pitch range typically reported for men as of their earliest recording. Though testosterone has an undeniable affect on transmasculine voices, I argue that hormones alone cannot explain the variable changes I found among my participants. Because biology and culture are fundamentally inseparable, it is crucial to consider the way the voice is shaped by socialization throughout the lifetime and the intersubjective identities that are produced by and simultaneously help to co-produce those socializing experiences. When it comes to formant frequencies, which are driven in part by articulatory habits learned early in life, these speakers as a whole show a significant negative correlation between formant frequency and weeks on testosterone.

However, I was unable to capture those changes on a real time basis for any one speaker. Findings from other researchers working with trans speakers suggest that changes in formant frequencies are possible (including the preliminary findings on trans men's voices described in Papp's 2010 dissertation prospectus). When I considered changes in the individual formants, the speakers as a group showed a significant negative correlation between time on testosterone and F1, no correlation for F2, and a significant positive correlation for F3. If these correlations reflect changes over time, it would appear that shifts in formants happen unevenly. On the other hand, these correlations may reflect inter-speaker variation more than intra-speaker variation. More likely still is that changes in formants happen in more complex patterns that are not captured by this first stage of acoustic analysis.

The production of [s], by further context, is not constrained by embodied sex differentiation and did show significant change over time for several speakers – in addition to a general negative correlation among these speakers between time on testosterone and the weighted mean frequency for [s]. In most cases, the significant or not-quite-significant correlations were negative ones, indicating that speakers were articulating a lower frequency [s] over time. However, as with formants, the changes were not always in the expected direction. Two speakers, Carl and Mack, produced [s] at higher frequencies over time. I explain this surprising observation in terms of a newfound sense of freedom to express femininity that my participants reported finding when their voices deepened and they began to be perceived as men. I support this claim with my participants' metalinguistic commentary. The emphasis they place on testosterone and disinterest they express in changing other gendered qualities in the voice also work to explain why these transmasculine individuals' voices have not changed **more**, given that shifts in articulation are entirely possible. I argue that my participants' maintenance of phonetic traits that might be read as "feminine" is driven in part by their desire to maintain what feels like an authentic way of speaking rather than engaging in the kind of self-monitoring they might need to do to eliminate phonetic signs of their gender assignment. Beyond speakers' ideologies, however, we must also consider the process of phonetic bricolage, in which changes to one linguistic variable can vastly recontextualize the others. Furthermore, because most of my participants actively disassociate themselves from

heteronormative cis masculinity, their non-normative speaking styles work to reflect and help constitute their gendered identities. In thinking about the relationship between gender and the voice, we need to consider phonetic styles as holistic constellations of features, rather than understand individual features, like the mean frequency in [s], in terms of a single linear scale of masculinity versus femininity. In order to account for the inter-speaker variation that shows up across the participants in this study, I argue that it is necessary to tap into transmasculine people's own notions about the multiple layers of gender. Gender assignment and role provide a useful way to talk about socialization in childhood and throughout the lifetime. Yet the most crucial distinction I make is between gender identity and gender presentation. While gender identity makes reference to the conceptual categories with which a person explicitly aligns themselves, presentation points to the semiotic expression of gender. By separating these facets of gender, we can see how transmasculine people are able to align and disalign with masculinity in a variety of ways.

There are a number of limitations to this dissertation, which I intend to address in my future research. An important starting point will be the inclusion of additional measurement tokens, particularly in the case of vowels, in order to pursue greater clarity about some of the trends that were documented in chapter 5. Because I recruited twice as many participants as I had originally planned, I was not able to analyze as many tokens as I might have with a smaller group of speakers, a larger number of vowel tokens will undoubtedly help illuminate any changes that might be taking place in formant frequencies. It will also be important to consider additional acoustic variables – especially voice quality, pitch range, and intonation – in order to see how variation in fundamental frequency interacts with other variables that might be influenced by changes in the larynx. Additional recordings would be useful as well, given that one year is for most people a relatively small period of time relative to the entire medical transition process. I intend to do follow up recordings, wherever possible, with the transmasculine people whose voices I analyzed for this project. It will be of interest to see how long the shifts I investigated here continue and to get a better picture of the overall course of transformation happening in these individuals' voices.

A more fundamental limitation is the fact that my acoustic analysis deals only with read speech, which means that the study provides a limited perspective on the range of phonetic styles my participants are able to enact. However, I plan to use the findings I have presented in this space as a starting point against which future analysis of interactional data from the same speakers can be compared. This kind of comparison will provide an opportunity to see how the phonetic characteristics that index gender vary across speaking contexts. Having analyzed speakers engaged in their “best linguistic behavior” provides special insights about the way my speakers use their voices when they are most likely to be thinking consciously about how they sound. I will begin my future work by considering how pitch varies across contexts. While transmasculine people on testosterone gain a physical capacity to produce low pitched speech, they do not necessarily make use of the lowest part of their range, as my analysis of Mack in chapter 6 indicates. It may be the case, then, that my speakers are able to more easily access their low-pitched voices when reading, whereas the interactions I have recorded may reveal ingrained patterns of pitch usage that do not appear in more careful or self-conscious speech. A comparative analysis of this sort will also shed light on the extent to which individuals’ gendered phonetic styles vary across contexts.

Including a more diverse group of speakers is another important way to explore variation in the voices of people who identify somewhere on the transmasculine spectrum. I have briefly discussed the significance of racial identity and the linguistic varieties associated with different ethnoracial groups in the United States, and bringing more trans people of color into my dataset would allow me to explore the important intersections of racialized and gendered identities. A wider range of ages, additionally, would give me the chance to test the folk wisdom that says older transmasculine people experience less significant changes in their voices than do younger community members. It would be interesting to consider the voices of transmasculine people who are not making use of testosterone, as well, in order to see what kinds of linguistic styles are constructed among those who cannot take advantage of the recontextualization provided by a much lower fundamental frequency. These speakers could also shed light on the potential for pitch to change in the absence of biological forces.

Finally, perceptual experiments would be a useful way to consider how different combinations of phonetic features are categorized socially. My primary interest in this area is the crossing point at which speakers begin to be perceived as male. Many of the participants in this study had unambiguously female voices before beginning testosterone and unambiguously male voices with a year or so. In chapter 2 I reviewed previous research on trans women's voices that suggests that 160 Hz is an approximate cross-over point that separates male- and female-sounding voices. However, my interest in linguistic bricolage leads me to question whether it is feasible that a single cross-over point exists regardless of other aspects of an individual's linguistic style. Significantly, Pol told me that he was still typically perceived as a woman, even though his final mean F0 in his read speech was 132 Hz, well below the 160 Hz mark. By using recordings sampled from throughout speakers' transitions, I can analyze the patterns of perception that illuminate how phonetic styles work to index a speaker's gender.

Despite its limitations, the dissertation contributes to a number of issues in the field of sociocultural linguistics. The most fundamental of these contributions is the problematization of dividing all voices into one of two binary gender categories on the basis of assigned or apparent sex. Undoubtedly, gender differentiation in the voice is a salient source for the construction of social identities. But the naturalization of acoustic gender differences masks the inescapable sociality that drives this differentiation process. It also obscures important patterns that drive intra-gender linguistic variation. When we delve into local understandings of gender in the transmasculine community, we find systems for talking about gender – distinctions between assignment, role, identity, and expression – that help use to understand the variability that exists among people defined ostensibly by their similar experiences with gender. The second major contribution of this work is toward our understanding of sociolinguistic change across the lifetime. On one hand, transmasculine voices highlight the potential for change in gendered phonetic features, including the most basic, biology-driven traits like fundamental frequency. On the other hand, however, my speakers carry with them not only their current identities and gender presentations, but also their varied and complex histories. Transmasculine speakers thus walk a fine line that leaves them with linguistic styles reflecting their past while at the same time recontextualizing it. Finally, this

dissertation fills in the large gap that remains in the language and gender literature on the linguistic practices of transmasculine people and other female-assigned individuals who do not self-identify as women. Kulick (1999) warns that the absence of people on the female-to-male identity spectrum from the language and transgender research has the potential effect of naturalizing masculine ways of speaking while highlighting feminine speech as the product of cultural construction. In the broader field of language and masculinity, much has been said about the constitution of hegemonic masculinity among gender and hetero-normative men (e.g. Cameron 1997, Kiesling 1997). Transmasculine speakers provide another perspective on the navigation of masculinity in its normative and non-normative forms. It is not necessarily the case that the masculinities being constructed by the trans speakers I have worked with are in some sense new or special. At the same time, the confluence of ideological and linguistic forces at work in shaping transmasculine voices results in many members of this community embodying male-sounding, yet non-normatively masculine, voices. Whether they maintain openly trans identities, or slip more seamlessly into the world of non-trans men, transmasculine speakers push us to reconsider the nature of masculinity and the various ways with which it can be engaged. By weaving together the linguistic resources they have accumulated through a lifetime of crossing and contesting gender, they challenge us to reformulate what it means to have a male voice, and what it means to be a man.

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APPENDIX A

THE RAINBOW PASSAGE

When the sunlight strikes raindrops in the air, they act as a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow. Throughout the centuries people have explained the rainbow in various ways. Some have accepted it as a miracle without physical explanation. To the Hebrews it was a token that there would be no more universal floods. The Greeks used to imagine that it was a sign from the gods to foretell war or heavy rain. The Norsemen considered the rainbow as a bridge over which the gods passed from earth to their home in the sky. Others have tried to explain the phenomenon physically. Aristotle thought that the rainbow was caused by reflection of the sun's rays by the rain. Since then physicists have found that it is not reflection, but refraction by the raindrops which causes the rainbows. Many complicated ideas about the rainbow have been formed. The difference in the rainbow depends considerably upon the size of the drops, and the width of the colored band increases as the size of the drops increases. The actual primary rainbow observed is said to be the effect of super-imposition of a number of bows. If the red of the second bow falls upon the green of the first, the result is to give a bow with an abnormally wide yellow band, since red and green light when mixed form yellow. This is a very common type of bow, one showing mainly red and yellow, with little or no green or blue.

APPENDIX B

TRANSCRIPTION CONVENTIONS

[]	overlapping speech
(())	non-linguistic action (e.g. laughter, coughing)
=	latching speech (i.e. continued from previous line with no pause)
(word)	uncertainty regarding transcription
(xxx)	indecipherable speech
^word^	falsetto voice quality
?	rising intonation
,	continuing intonation
.	falling intonation
bold	increased volume
:	lengthened phone