SOCIOPHONETIC VARIATION AND IMITATION IN NONBINARY SPEAKERS

By

Jack Rechsteiner

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ABSTRACT

This thesis seeks to build upon the growing body of research on nonbinary-gendered speakers (Gratton 2016; Goldberg & Kuvalanka 2018; Garmpi 2020) by employing two studies – a sociolinguistic interview study with nonbinary participants to investigate variable usage of (ING) by nonbinary speakers across conversation topics and a phonetic imitation task that tests the effect that social information about an unknown interlocutor has on nonbinary participants' speech production. The results of the sociolinguistic interview study find that despite a markedly more deliberative style during topics about gender, participants do not shift rates of (ING) across topics. Furthermore, the sociolinguistic interview study finds that a speaker's assigned gender at birth *plays no predictable role* in rates of (ING). The results of the phonetic imitation task find that nonbinary speakers show statistically significant greater divergence away from a model speaker that is stated to be cis than a model speaker stated to be nonbinary or a model speaker where no gender identity information is given. Additionally, the phonetic imitation task results find that nonbinary speakers show statistically less divergence away from a model speaker stated to be nonbinary that a model speaker stated to be cis or a model speaker where no gender identity information is given. Taken together, the results of these two studies suggest that nonbinary speakers have a speech style that is more likely to pattern with other nonbinary speakers in their network and that being in explicitly queer contexts enables nonbinary speakers to pattern more like another nonbinary speaker than like a cis-identified speaker.

TABLE OF CONTENTS

1. INTRODUCTION

The goal of this master's thesis is to examine the construction of nonbinary gender identity through language and how language operates to signal "queer spaces". This thesis will be building upon the work by Gratton (2016, 2017) on variable (ING)[1] production in nonbinary speakers. Gratton (2016, 2017) observed that speakers shift away from the variant associated with their sex-assigned-at-birth in non-queer spaces and proposed that the *threat of being misgendered* is one of the primary reasons nonbinary speakers shift their usage of (ING). However, in my previous work (Rechsteiner 2021) and in the work I present here, I identify some additional factors that may influence nonbinary speakers' linguistic production, such as topic and interlocutor effects. In the current thesis, I conduct two studies to examine the effects of topic and interlocutor, respectively. The first study expands on my undergraduate senior thesis (Rechsteiner 2021), which used sociolinguistic interviews to investigate (ING) production of six nonbinary speakers, by including an additional four nonbinary speakers for a total of ten participants. This sociolinguistic interview study provides a means for observing the presence or absence of topic-based shifting. The second study is a phonetic imitation task that tests the effect that social information about an unknown interlocutor has on nonbinary participants' speech production. This phonetic imitation study allows for an investigation of interlocutor effects that may influence nonbinary speakers' speech production. This thesis is a continuation of the work done by Rechsteiner (2021), as it introduces new data to the analysis as well as investigates factors which were outside the scope of the previous research.

This research provides an opportunity to increase the sociolinguistic understanding of how social identity informs linguistic production by analyzing the ways that nonbinary speakers

[1] The variable (ING) refers to two primary variants – the velar [ɪŋ] variant and the alveolar [ɪn].

employ linguistic resources to construct gender identity through stylistic choices. While much linguistic research has been done on how conventional male–female binary gender and language variation interact, there has been less research done on speakers outside of this binary which means that the research here presents an opportunity to add nuance and a fuller understanding of the interactions between gender and language variation. Research focusing on linguistic variation of nonbinary speakers allows for questions which were not able to be explored with previously restrictive theories of gender, and this research can thus broaden sociolinguistic frameworks and expand the field's knowledge on the ways that speakers convey social meaning through their linguistic style. (ING) provides an especially salient linguistic variable for this research, as previous research has established that it is associated with gender (Fischer 1958; Trudgill 1974; Tagliamonte 2004; Campbell-Kibler 2007), and further investigation of the variable use of (ING) by nonbinary speakers will allow for a more nuanced understanding of how linguistic patterns serve to index a speaker's gender. The phonetic imitation study allows for an investigation of the degree to which speakers are informed and influenced by socially salient identities, even in minimally interactive conditions. This has the potential to raise implications for what factors motivate linguistic accommodation in a general sense. Taken together, these two studies have the potential to provide a new and interesting avenue for examining how social identity and the perception of social identity play a role in a speaker's linguistic production.

The structure for the remainder of this paper is as follows: In Section 2, I will review background literature on sociolinguistics and gender, gendered variation in the variable (ING), the effects of topic and identity on linguistic style, as well as linguistic shadowing and how it is impacted by social knowledge. Section 3 focuses on the sociolinguistic interview study and discusses the methods used, the results which found no effect for topic or sex-assigned-at-birth

across the 10 speakers, and an overview of the discourses employed by speakers in describing their gender experiences. In Section 4, I focus on the shadowing task experiment and discuss the methods used, the results which found nonbinary participants diverging the least from a nonbinary-identified model speaker and diverging the most from a cis-identified model speaker, and the significance of the results. Section 5 concludes the paper with an argument for the existence of a distinct nonbinary style based on the results of these two studies, a discussion of the impact that explicitly queer settings have on the linguistic productions of nonbinary speakers, a call to sociolinguists to revisit how gender is viewed in the field, and a look ahead to directions that are open to future research.

2. BACKGROUND

2.1 Sociolinguistics and the Gender Binary

Gender has been used as a sociolinguistic variable because of its salience in public discourse and power relations (Trudgill 1972; Lakoff 1973) as well as being a key component of many social hierarchies (Enke 2012, p.1). Features such as pitch, loudness, pronouns, affect, and directness have all been shown to hold potential gendered meaning (Corwin 2009). Previous studies have asserted that "the clearest and most consistent results of sociolinguistic research in the speech community are the findings concerning the linguistic differentiation of men and women" (Labov 1990). Even with such a long-standing precedent being set by past research, the fundamental concept underpinning gender differentiation as it relates to the male–female binary is "undertheorized and simplistically understood" in the sociolinguistic field (Becker et al. 2022). Because research has provided evidence that biological or physical differences only play a minor role in variations observed between speakers of differing genders (Zimman 2017), the research I am conducting looks to go beyond the male–female gender binary in a way that will expand on the linguistic understanding of gender. It has been shown that gendered variation in language is substantially influenced by the social practices that a community uses to construct gender differences and how speakers use these practices to align with or break from the gender binary (Eckert & McConnell-Ginet, 1992). Calder and King (2020) additionally showed that factors, such as a speaker's racial group or their region, condition the degree to which a linguistic feature is expressed as a gendered variant or whether it is expressed as a gendered variant at all. I hypothesize that my research will allow for a better understanding of what factors are influential in the linguistic variation employed by nonbinary speakers. Zimman (2017) argues gender is constructed through "stylistic bricolage" consisting of an array of linguistic features that are used

in relation to one another in a variety of ways to create a variety of gender identities, and that gendered speech variation should be viewed as speakers selectively using and modifying linguistic features to suit their own needs in creating the social meaning that they desire.

Existing research on those who are outside the cisnormative binary has largely focused on the experiences of trans people with binary trans identities (Goldberg & Kuvalanka 2018); however, the amount of research on speakers with gender identities outside of the transnormative and cisnormative binaries has been starting to increase in recent years (Bradford et al. 2019; Garmpi 2020). Corwin (2009) studied nonbinary speakers who produced both masculine and feminine indexing phonetic features, such as combining a small pitch range with a high rate of high rise terminals, to create a speech style that "demonstrates a uniquely non-binary linguistic pattern". Corwin goes on to say that "the linguistic tool is used to construct a gender presentation that does not fall along strictly binary gender lines. While on a micro-level these are only small phonetic features, on a social level, the unique use of these features hold social meaning". In a similar way, Steele (2019) observed nonbinary speakers who produced non-gendered speech through stylistic bricolage of linguistic features that are normatively indexed as feminine and masculine. Garmpi (2020) put forth a thematic analysis of the narratives of seven nonbinary individuals which showed how these individuals performed their gender through a combination of overtly gendered linguistic features and features which covertly index certain kinds of gendered styles; additionally, this study showed that nonbinary individuals actively subverted the normative female–male binary as a way to create social space for their identities. Taken together, these studies provide evidence that nonbinary identities are a site of unique and active linguistic identity construction.

2.2 (ING) and More Gender

The variable (ING) is used to refer to two primary variants: the standard velar [ɪŋ] and the nonstandard alveolar [ɪn]. (ING) has been found to be a socially meaningful linguistic variable which is salient to speakers as a defined social object; for instance, listeners have been documented as perceiving the velar *–ing* to be more metropolitan and less masculine than the alveolar *–in* (Campbell-Kibler 2007). The social associations of (ING) are not fixed meanings, but it is a variable that a speaker can manipulate to affect their linguistic style in a way that is perceptible to a listener, in relation to other semiotic features that the speaker provides (Campbell-Kibler 2006). Studies have analyzed (ING) as patterning along gender lines in sociolinguistics since the mid twentieth century. Fischer (1958) observed differences in usage of (ING) for past participle endings between the girls and boys of a New England village, with the girls using the velar *–ing* variant more than the boys. Since 1958, further research on (ING) has provided evidence that the variable is affected by external factors, which include gender along with style, social class, and others (Shuy et al. 1968, Houston 1985, Hazen 2008). Labov (1990) states that "Among the clearest and most consistent results of sociolinguistic research in the speech community are the findings concerning the linguistic differentiation of men and women" and proposes the principle that "In stable sociolinguistic stratification, men use a higher frequency of nonstandard forms than women". This principle of linguistic variation has been seen to apply to (ING), with data showing that female-gendered speakers use the standard *–ing* variant at a higher rate than male-gendered speakers (Trudgill 1974, Tagliamonte 2004). However, previous literature has argued that sociolinguistic variants, such as (ING), do not index identities inherently, including gender identities (Eckert 2014, Calder 2021). In line with this argument, research by Gratton (2016, 2017) has shown that (ING) is used by nonbinary speakers

in constructing various gender identities through their rate of standard to nonstandard usage.

Gratton (2016, 2017) observed nonbinary speakers using (ING) variants at differing rates in different speech environments dependent upon the identity that the speaker felt the need to present in those social contexts. This research analyzed sociolinguistic interviews of two nonbinary consultants, one who was AMAB (assigned male at birth) and one who was AFAB (assigned female at birth). The interviews took place across two different contexts – queer settings and non-queer settings. Interviews in the queer settings took place at a consultant's home and at a coffee shop known for its gender-queer staff and queer-friendly environment, and interviews in the non-queer settings were conducted at a popular cafe chain in a busy downtown area. Gratton found that the consultants had similar rates of (ING) in queer contexts, but both consultants decreased their rates of the (ING) variant associated with their sex-assigned-at-birth when in non-queer contexts. Gratton proposed that this was due to the routine threat of being misgendered in cis spaces and that the participants were utilizing a gendered variable like (ING) to create specific stances as a means of mitigating the threat of being misgendered.

2.3 Topic-based Shifting

Topic-based shifting is a type of sociolinguistic style shifting, and it is used to describe changes in a speaker's linguistic production that accompany changes in the topic they are speaking about. Based on the results of a production task experiment, Drager et al. (2010) argue that speech production can be influenced by speech topics activating conceptual labels that a speaker associates with that topic which can lead to the activation of phonetic features related to those conceptual labels. In the context of a reading task, Walker (2014) reports that the effect of topic had a significant effect on American English speakers and British English speakers such

that American-themed topics elicited more American English pronunciations and British-themed topics elicited more British English pronunciations. It is attested in the literature that speaker identity and its relevance to the conversational topic is a significant factor in causing topic-based shifting (Becker 2009). Grieser (2019, 2022) found that African American speakers showed higher rates of final consonant devoicing, an African American Language feature, when speaking about topics such as African American community and family. Similarly, Wan (2021) observed that speakers of Taiwan Mandarin who are active supporters of the deaf community shifted to a more retroflexed variant of /ʂ/, which is a socially salient variable, as a way of performing 'deafness' during deaf identity topics. Gratton (2016) did not check for the possible effects of topic in their study of nonbinary speakers' production of (ING), but this may be an interesting place to look for variation based on the findings that the research above has found on the influence that a speaker's identity has on their speech production when they are talking about topics related to their identity. In Section 3, I analyze topic-based shifting in 10 nonbinary participants to see if gender identity topics have an impact on their pronunciation of (ING).

2.4 Social Information in Phonetic Imitation

While the first study in my thesis investigates the impact that topic has on nonbinary speakers' production of (ING) in naturalistic speech to see if gendered topics impacts speakers' production, the second study looks at the impact that social information has on nonbinary speakers' linguistic behavior in a shadowing task. Specifically, I will use a shadowing task paradigm to investigate whether knowing that a model talker shares a queer identity with the participant makes the participant more or less likely to converge with the model talker. Phonetic imitation (sometimes called phonetic convergence) is a speech production process "in which a

talker takes on acoustic characteristics of the individual they are interacting with" (Babel 2012). Phonetic imitation falls within the broader category of linguistic accommodation, and accommodation has been thought to generally be "motivated by a desire to affiliate with or decrease social distance to a fellow interactant" as well as "underscoring common social identities" (Gasiorek et al. 2015). Babel (2012) provides evidence that phonetic imitation is at least partly socially facilitated; in this study, participants who saw a picture of a model talker imitated that talker more than participants who did not see an accompanying picture of the talker they listened to. Speakers exhibit phonetic imitation in both minimally social laboratory settings (Goldinger 1998; Goldinger & Azuma 2004; Shockley et al. 2004) and in cooperative, conversational situations (Pardo 2006; Pardo et al. 2018). Studies have also shown that speakers require little time to begin imitating another speaker and that this imitation persists after the speakers are done interacting (Pardo 2006). In Section 4, I present the results of a phonetic imitation task that investigates whether the perceived gender of a model speaker impacts the degree of convergence exhibited in the speech of nonbinary participants.

3. STUDY 1: (ING) pronunciation by topic in sociolinguistic interviews

3.1 Methods

This master's thesis conducted sociolinguistic interviews with a total of 10 nonbinary participants. Six of these interviews were already conducted as part of my undergraduate senior thesis with participants who I recruited through my personal connections within a community of queer individuals (Rechsteiner 2021). The additional four participants were recruited using the same methodology. All ten participants lived in Michigan at the time of the study, had some level of college education, and ranged in age from 21 to 27. Five participants were AFAB and five participants were AMAB, which makes the distribution of participants equivalent to the participants in Gratton (2016) while increasing the size of the participant pool. A modular interview guide was developed based on Labov's Q-GEN-II modules (1984) which is provided in Appendix A. The Q-GEN-II modules were modified to include topics relevant to nonbinary gender identity, including their experiences as a nonbinary individual, the ways they expressed their gender, their queer community relationships, and their perceptions of cis speech. Questions were written to accompany each module and questions were formed to be open-ended in an effort to elicit narrative or conversational speech styles.

Interviews were conducted virtually over the web-conferencing platform of Zoom. Audio was recorded by participants locally using Audacity, or, when that was not an option, with the service Cleanfeed which utilizes the Opus codec to record audio live[2]. No video was recorded during the interviews. Interviews ranged in length from 40 to 60 minutes long. Participants were encouraged to discuss any topics that interest them even if they are not in the pre-written questions. It was made clear to participants that they can decline to speak about any topics that

[2] The participants who had their audio recorded with Cleanfeed are: BH, GW, JB, and TW.

make them uncomfortable, without fear of penalty or being removed from the study. The interviews always began with conversation-starting questions from the demographic module before moving into other modules to allow participants to become comfortable with the interview process. Participants were fully briefed before each interview and debriefed afterward. The consent form for the study is provided in Appendix B. The setup of this study allowed for the research to focus on investigating the effect of topic, as the effects of the interlocutor, the threat of misgendering, and the environment were controlled for. Interlocutor effects were controlled for by having myself as the only interviewer for this study, in addition to myself sharing a nonbinary identity with participants. Threat of misgendering was controlled for as I was already familiar with the participants and their gender identities prior to the study, and I have similar gender ideologies to those of the participants. Conducting interviews one on one via Zoom allowed for environment to be controlled for as well, because participants were able to remain in a setting that was comfortable to them.

Coding for (ING) was done auditorily in Praat using the handCoder Style praat script (Fruehwald 2012), and monosyllabic content words were excluded from the analysis. Coding for topic was based on interview content; for example, participants talking about their own gender experience, answering questions during the gender module of the interview, or gender as it came up organically in other topics was coded as Gender, and all other contexts were coded as Not Gender. Coding was also done for the lexical category of tokens[3] because (ING) variation has been shown to be morphologically conditioned (Houston 1985). After coding, the data was run through a mixed effects logistic model in R with the dependent variable of (ING) pronunciation,

[3] The lexical categories used were Verb which included verbs and phrasal verbs, Noun which included nouns and proper nouns, Adj which included adjectives and adverbs, SN which included ‘something’ and ‘nothing’, and G which included gerunds.

the main effects of style, sex-assigned-at-birth, and part of speech, and a random intercept for speaker and a random intercept for word so that lexical frequency was taken into account. The analysis included an interaction effect between style and sex-assigned-at-birth, as this follows the findings in Gratton's work that the direction of shift may be different for AFAB nonbinary speakers and AMAB nonbinary speakers. The model formula used was: *lmer*(*ING ~ Topic * SexAtBirth + PartOfSpeech* + (1|*Word*) + (1|*Speaker*).

A total of 1334 tokens of (ING) were analyzed for the ten participants. Figure 1 shows the overall rates of the standard variant *–ing* for each participant across the entire interview, with speaker along the x-axis and proportion *–ing* pronunciation overall along the y-axis. Bars depict standard error. The results find that all participants produce similarly high rates of the standard *–ing* variant, with the exception of participant MS. MS's slightly lower rates of *–ing* is not altogether surprising: MS is the only participant from Michigan's Upper Peninsula. The Upper Peninsula of Michigan is a region that is geographically separate from the rest of Michigan and – more importantly for (ING) realization – is strongly associated with rural and working-class identities (Rankinen 2014), which in turn have been found to correlate with higher rates of the nonstandard *–in* variant.

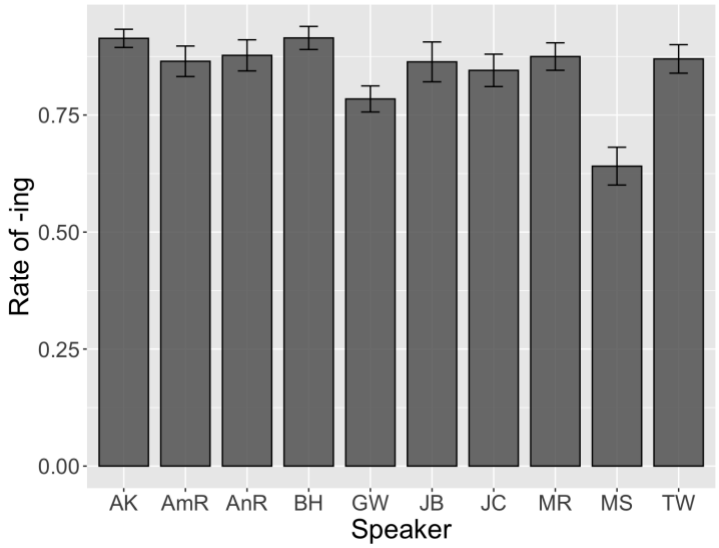

Figure 1: Speakers' overall rates of *–ing*.

Figure 2 shows each participants' rates of *–ing* across the two topic categories. Again, speaker is presented along the x-axis, and proportion *–ing* pronunciation is provided along the y-axis. Bars depict standard error. Gender-related topics are presented by the dark purple bar, while all other topics are presented by the light blue bar. The results in Figure 2 suggest that participants do not shift their pronunciation of (ING) across different topics.

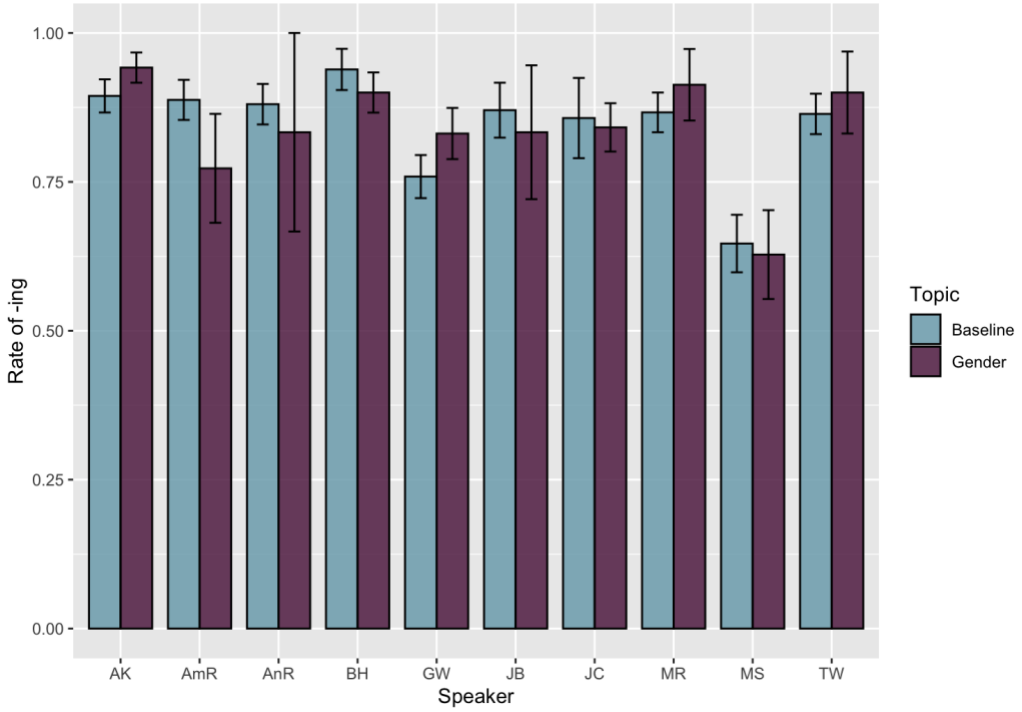

Figure 2: Speakers' rates of *–ing* by topic.

This main finding is confirmed by the results of a mixed-effects logistic model, which are shown below in Table 1. The values for *–ing* are significant, which is to be expected because all participants were shown to have high rates of *–ing* overall. The values for Topic(gender) are not significant which shows that topic does not have a statistically significant effect on the participant's rates of *–ing*. Similarly, sex assigned at birth does not show any significant effects; in other words, a speaker's sex assigned at birth plays no predictable role in their rates of *–ing*. The next four rows show the effect that lexical category had on rates of *–ing*, with adjectives/adverbs as the baseline, and none of the lexical categories showed a statistically significant effect on influencing speaker's (ING) productions. The last row shows no interaction between style and sex assigned at birth, which means that in addition to there being no significant results for the effects of topic or sex assigned at birth, there are not significant results

for the interaction between these social effects.

Fixed effect	Estimate	P value
–ing	**0.95**	**<0.001*** **
Topic(gender)	-0.03	0.39
SexAtBirth	-0.09	0.15
PartOfSpeech(Gerund)	0.04	0.42
PartOfSpeech(Noun)	0.09	0.13
PartOfSpeech(Some/Nothing)	-0.07	0.42
PartOfSpeech(Verb)	-0.06	0.13
Topic:SexAtBirth	0.06	0.20

Table 1: Results of the mixed effects model for topic-based shifting.

Model formula – *lmer*(*ING ~ Topic * SexAtBirth + PartOfSpeech* + (1|*Word*) + (1|*Speaker*)

3.2.1 Discussion of Results

The results of this study found that the ten nonbinary participants had stable usage of (ING) across the two topic categories *(gender* vs. other), which suggests that indexical field activation and topic-based shifting are not major influences for shifting rates of (ING) in nonbinary speakers. This is in keeping with the results of Rechsteiner (2021) which showed that six of the nonbinary speakers interviewed did not shift rates of (ING) based on topic, even when participants exhibited a more deliberative style while discussing *gender* topics such as gender identity and presentation. Setting and the perceived threat of being misgendered were controlled for in the study, so the fact that my participants did shift their production of (ING) across topics

is in line with Gratton's (2016, 2017) argument that nonbinary speakers shift their production of (ING) due to the threat of being misgendered. Furthermore, I find that a participant's assigned gender at birth plays no predictable role in rates of (ING), suggesting that nonbinary speakers form their own linguistic community that operates outside of the gender binary. This is congruent with the observation given by Darwin (2017) that nonbinary individuals subvert "normative scripts of gender display/linguistics" to create stances which "contribute toward the redoing of gender to include options beyond man and woman". This provides further support for the notion that nonbinary speakers employ linguistic features, that are used traditionally by other gender identities, in a distinctly nonbinary style. This allows these speakers to establish a 'nonbinary' indexical meaning as a means of asserting their identity through stylistic bricolage, whether they are consciously aware of it or not. act on their pronunciation of (ING).

3.3 Figured Worlds: Gender according to the participants

While my nonbinary participants don't show a difference in (ING) pronunciation by topic, this does not mean that gender is not an important topic in their interviews. Here, I draw on discourse analysis practices to show how gender and hegemonic ideologies about the gender binary weigh on participants' everyday speech interactions. Specifically, I employ a Figured Worlds (Gee 2014) analysis which looks at the assumptions a speaker must make about the world in order to say the things they do, and I use this approach to examine the figured worlds that my participants invoke in talking about gender and how they show participation in or opposition to these figured worlds. The excerpt below focuses on one participant's discussion of their nonbinary identity which is framed by one such figured world.

Excerpt 1 (from AmR)

> *Well, I always as a child knew that I didn't really fit into either one or the other type of binary situation as far as genders go. Not specific moments, but overall there was a feeling of like -- I guess one of the things that I've always thought about is that I -- I didn't really like playing with dolls as a child. I didn't like baby dolls. I had them and I had Barbie dolls, but they weren't really something that I was that interested in playing around with. I mostly liked playing outside in the dirt and, like, running around barefoot and kind of just being wild and free like building strange things in the woods and exploring random places and playing with bugs and kind of being a tomboy to some extent. Which I feel like the difference between that and possibly somebody who considers themself to be female is that they -- they may have been interested in those things, but were also interested in, like, doing their hair and their nails and make-up and playing with dolls and things like that, which is obviously still something I did but it didn't come as naturally to me as other things.*

AmR can be seen invoking the hegemonic ideology of 'gender is binary' in a way that explicitly states that girls are supposed to be interested in activities like playing with dolls and implies that in this hegemonic ideology, activities like "running around barefoot… being wild and free" are meant for boys through the assertion that these activities amount to AmR-as-a-child being seen by others as "a tomboy to some extent". This participation in the typical 'gender is binary' story is then directly opposed by AmR's claim that there is a "difference between that [their childhood activities] and possibly somebody who considers themself to be female" and challenges the construction of socially acceptable femininity by saying that someone who

identifies as female can be interested in those ‘tomboy’ activities but also would be interested in activities like “doing their hair and their nails and make-up and playing with dolls”, which are expectations that AmR did not “naturally” find interest in. This figured world is illustrative in showing that for this nonbinary speaker, gender is something being done to them in regard to outside observers finding ways to place them within the gender binary even when certain actions may not be congruent with hegemonic expectations of successfully performing a binary gender. In navigating the realities of a social world with a presupposed gender binary, my participants show that they have to decide within interactions whether to work to actively reject the gender binary that is superimposed onto them or to operate within the gender binary when it is more advantageous to do so. The latter option becomes especially apparent in discussions where my participants are aware of the threat posed by non-queer spaces, as seen in the following excerpt.

Excerpt 2 (from GW)

> *In some places, it's like I would like to not be perceived as queer currently and other places, it's like -- it's fine for me to be queer, but I don't feel like I -- Like my physicality doesn't fit how I wish I could act and therefore will conform to something I feel I look like rather than am. Like I'll -- I'll -- I'll feel like I am more easily perceived as masculine to people who -- who are looking at me and therefore will act that way as to not alienate them by acting more feminine than I look or something like that. Yeah. But that never -- also never feels good at all. In any way… Like I'll -- I'll walk a way as to like attempt to deter people from interacting with me or like -- or like picking me out as like someone that could be targeted or like depending on what I'm wearing I'll like -- 'cause I got boobies now I'll have to like arch my -- my shoulders forward to like -- like hide them*

sometimes or I won't move my arms nearly as much when I'm talking to strangers like in -- in -- in -- with people I'm comfortable with my -- my hands are everywhere. Yeah. Yeah and I do the -- the -- I don't notice it as much but [redacted name] points it out that I am -- I do the very limp wristed thing, I guess, which I don't think happens as much when I'm around people that I don't know.

In this excerpt, GW constructs a figured world where there are social actors who are looking to pick out or target people who seem queer. This is a very real concern, but my intention in identifying this as a figured world is that GW talks about the situation as an imagined hypothetical which marks this passage as distinct from a narrative that recounts a specific instance of these types of events occurring. The figured world that GW invokes is used as their justification for their differing habits in places where they are "with people I'm comfortable with" and places where they are around "strangers". This provides an interesting point because it shows that this figured world has a lot of salience and consequence for GW in how they exist in their daily life, as well as portraying two general groups of people in the world – those that GW is comfortable with and therefore safe to express themself around, and those that present the possibility of a threat to GW which includes "strangers" and "people that [they] don't know". This provides evidence for Gratton's (2016, 2017) argument that the *threat of being misgendered* is an explanation for nonbinary speakers' variable usage of (ING) in spaces that are queer as opposed to spaces that are not queer, as this participant is consciously choosing to employ different linguistic and semiotic means in situations where non-queer individuals are perceived as a possible threat. Excerpt 3 from the speaker MS, included below, also shows an awareness to the harm that can occur in cisnormative spaces and the Figured Worlds tool is helpful in bringing this to the fore.

Excerpt 3 (from MS)

> *I grew up in the U P, which is very masculine-feminine, very conservative. So I had like a lot of like internal bias, like a lot of like various like transphobia, homophobia I had to deal with and kind of like work through. And then like, counseling has helped quite a bit over the past couple years and just further distancing myself from like my family slash who I was back in the U P. It was like being away from the wh- like the -- the family that kinda thing. Being in a like -- in a new environment where like, by and large, no one knew me really like allowed me to like better figure out who I was and experiment without the ne- without like outside judgment or like harsh criticism.*

MS can be seen here invoking real worlds that are made explicit in the conversation as well as figured worlds that contain implied information. The opening line describes the world of Michigan's Upper Peninsula as one that has an ideology about gender roles that are "very masculine-feminine" and is politically "very conservative". This serves to build a figured world where having conservative politics and rigid masculine-feminine gender roles necessarily entails transphobic and homophobic ideologies, as MS's time in the Upper Peninsula resulted in having "internal bias" related to transphobia and homophobia. This is further supported in the next part of the excerpt where this transphobic and homophobic figured world is now populated by MS's family and who they were "back in the U P", and that having distance from those entities has been helpful to "deal with and kind of like work through" the internal biases that were learned through participation in this world. Another compelling piece of evidence for how this figured world shows MS's awareness of the threat posed by non-queer spaces, is in the final part of the excerpt where MS introduces social actions into the figured world by contrasting it with a

different setting. In talking about "being in a new environment where… no one knew me", MS states that they were able to "better figure out who I was and experiment without… outside judgment or like harsh criticism" which contextually serves to indicate that these unwanted social interactions of "outside judgment" or "harsh criticism" are operating in the figured world being invoked here due to the transphobic and homophobic ideologies that dominate it. In navigating these juxtaposed worlds where it is either safe or not safe to be seen as queer, these participants show that they are sharing similar semiotic goals and meaning-making practices in their work to come across as queer or not depending on the context they find themselves in. This analysis of the figured worlds of these speakers supports the view that these speakers constitute a community of practice and that gender, to them, is both an important component of their lives but is also something which must be considered and displayed accordingly in the interactional settings that they are within. The salience of this threat posed by cis spaces provides a lens through which to understand the next experiment I discuss in this thesis which seeks to test whether being in an explicitly queer setting (even one that is non-interactional) impacts the linguistic behavior of nonbinary speakers.

4. STUDY 2: VOT imitation by social context in a shadowing task

4.1 Methods

Gratton (2016, 2017) observed nonbinary participants varying their linguistic patterns in queer contexts compared to cisgender contexts and proposed that this was due to the routine threat of being misgendered in cisgender spaces and the linguistic shifts that the speakers exhibited were motivated by the desire to counteract the possibility of their gender being assumed incorrectly. The current experiment aims to build upon Gratton's findings by investigating the degree to which social context affects the amount of phonetic imitation exhibited by nonbinary speakers. The contexts (queer vs. not queer) that were active in Gratton's study are replicated here by presenting participants with one of three model speaker conditions – one where the speaker is explicitly said to be nonbinary, one where gender identity information is not given for the model speaker, and one where the speaker is explicitly said to be a cis man. Previous phonetic imitation studies have shown speaker gender does not have a consistent, significant effect on imitation (Namy et al. 2002, Pardo 2006, Schertz & Johnson 2022), and this was further confirmed by Pardo et al. (2018) who compared the results of a speech shadowing study and a conversational convergence and found no difference in convergence by gender or gender-pairing. This lack of gender effect for phonetic imitation provides a precedent that if a difference in phonetic imitation *is* seen in the three different conditions, it will have been caused by the social contexts of the model speaker either sharing a queer, marginalized identity with the participant or not sharing this identity with the participant across the three conditions.

The specific phonetic variable of interest will be voice onset time (VOT), which is defined as the length of time that passes between the release of a stop consonant and the onset of voicing. For the purpose of this experiment, VOT is equivalent to a practical measurement of the

aspiration of voiceless stops. VOT has been well documented as a phonetic object that can be the target of convergence (e.g., Shockley et al., 2004; Nielsen 2011; Schertz et al. 2021). Nielsen (2011) reported results which showed participants imitating extended VOT after exposure to a model speaker who produced extended VOT in a non-shadowing elicitation task. Additionally, extended VOT was chosen because it is not known to be stereotyped to gender, extended VOT stimuli are easy to artificially create through acoustic manipulation, and extended VOT has no phonological perception consequences for voiceless stops in English (Nielsen 2011).

4.1.1 Participants

This study recruited 45 nonbinary participants through the researcher's connections within queer communities, as well as through online social media groups. Participants were distributed evenly across the three conditions, resulting in 15 participants for each condition. Choosing to only recruit nonbinary participants was done so that there would be fewer cross conditions in the analysis of the data, which should provide a clearer interpretation of the eventual results. The study took participants roughly 15 minutes to complete, and participants were compensated with a $5 Amazon gift card for their participation.

4.1.2 Stimuli

The stimuli consist of 54 words, 40 target words and 14 filler words, providing a distribution of 1 filler word for every 2.86 target words. All of the words in the stimuli are bisyllabic, stress-initial words with a frequency between 1 and 25 per million based on frequency scores provided by the SUBTLEXUS database (Brysbaert & New 2009). Low frequency words were chosen because previous research has shown low frequency words to be imitated more than

high frequency words (Goldinger 1998). In addition to these previous findings, high frequency words have been shown to be more subject to irregularities in their realization, such as being more prone to lenition (Bybee 2000). For the target words, 16 have word-initial /p/, 16 have word-initial /k/, and 8 have word-initial /t/; no target words have initial onset clusters. All 14 filler words begin with vowels. This stimuli set is consistent with the stimuli used in previous studies on extended VOT convergence (Shockley et al. 2004; Nielsen 2011; Schertz et al. 2021). All stimuli words are given in Appendix C, along with their frequencies.

The model speaker was an American English speaker who was determined to sound appropriately gender-ambiguous to listeners via a pre-experiment norming study. The model speaker provided recordings of the 54 stimuli words, as well as the audio instruction portion of the experiment (scripts for the written and the audio instructions are given in Appendix D). These recordings were modified to ensure that the extended VOT was prevalent enough to be a target for convergence. The original VOT of initial consonants was measured and then extended using the Duration Tier in Praat's manipulation features (Boersma & Weenink 2022) to create VOTs that were, on average, 102% longer than the original VOT. This method was chosen in order to avoid auditory aberrations, such as aperiodic bursts, that can occur when manipulating VOT through other means.

4.1.3 Conditions

The experiment consists of a shadowing input-driven elicitation task where each participant is assigned to one of three conditions for a between-subject experiment design. In this experimental paradigm, words are presented to participants before, during, and after exposure to a model speaker and participants record themselves speaking the word aloud. The experiment

was built with and administered online using PsychoPy (Peirce et al. 2019). After giving informed consent, participants completed a demographic survey to collect information on their age, gender identity, residential history, race/ethnicity, and education. Participants then took part in three phases of the shadowing task where they recorded themselves saying the given word within the carrier phrase, "The word is ____."

Phase 1 (Baseline Phase) elicited participants' baseline productions by presenting written instructions and words on the screen without any auditory exposure. Phase 2 (Exposure Phase) presented participants with audio instructions and words read aloud by the model speaker. The choice to have audio instructions given by the model speaker was so participants can familiarize themselves with the model speaker before being given the words. Phase 3 (Post-exposure Phase) again presented participants with written words with no accompanying audio. The order in which the words were presented in each phase was randomized for all participants. This flow is shown visually in Figure 3.

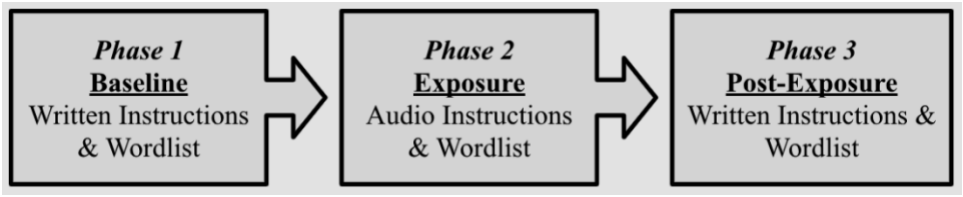

Figure 3: Flow diagram of the Shadowing Task.

In the Exposure Phase, participants were given auditory instructions from one of three conditions. In the Nonbinary Condition, the model speaker begins by explicitly identifying themself as nonbinary ("My name is Sam. I am nonbinary and my pronouns are they/them"). In the Neutral Condition, the model speaker does not give any information about their gender ("My

name is Sam"). In the Cis Condition, the speaker explicitly identifies themself as cis ("My name is Grant and my pronouns are he/him"). Aside from this introductory gender identity information, the recordings for the model speaker were identical in each condition. The recordings were from the same model speaker in each condition, and the pre-experiment norming study on gender ambiguity of the model speaker aimed to mitigate effects that would cause participants to assume the gender of the speaker in the Neutral Condition. The structure of these conditions was motivated by the hypothesis that nonbinary speakers are more likely to converge with a model speaker they perceive as nonbinary, as suggested by the results from Gratton (2016, 2017) which showed nonbinary participants were more likely to pattern together in queer spaces than in non-queer spaces. Even in the limited interaction situation of an online shadowing task, participants in the Nonbinary Condition are involved in a queer virtual space with the model speakers, while participants in the Cis Condition are involved in a virtual space that is not explicitly queer-exclusive.

4.2 Phonetic Imitation Analysis and Results

Following Nielsen (2011), the VOT of participant responses were measured based on their waveforms and spectrograms in Praat. Recordings of the shadowing task were transcribed orthographically and then force aligned using the Montreal Forced Aligner (McAuliffe et al. 2017) via DARLA (Reddy & Stanford 2015). Measuring the VOT of target words in Praat was done manually, assisted by the get_vot Praat script (Kang 2017). The results were analyzed using a linear mixed-effects model in RStudio, with VOT as the dependent variable and an interaction term between the fixed effects of Experiment Phase (Baseline, Exposure, and Post-Exposure) and Condition (Neutral, Cis, and Nonbinary), and fixed effects for the initial stop (p, t, k).

Random intercepts were included for speaker and word. The model formula used was: *lmer*(*VOT* ~ *Phase* ∗ *Condition* + *Initial stop* + (1|*Speaker*) + (1|*Word*)).

Unexpectedly, all conditions saw a decrease in participant VOT values during the Exposure Phase compared to their Baseline Phase, suggesting divergence from the model talker. The results are shown as a box plot in Figure 4, with VOT values along the y-axis and condition along the x-axis, with each condition having a plot for the Baseline, Exposure, and Post-Exposure phases.

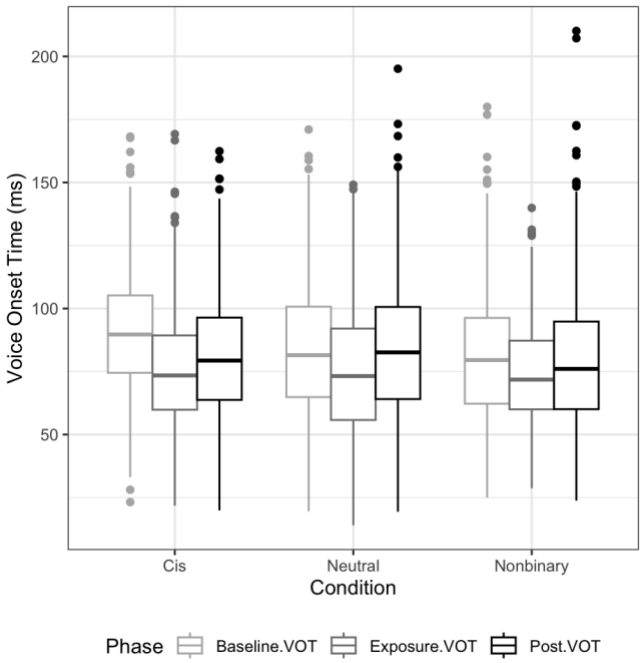

Figure 4: VOT values across the 3 conditions.

The decrease in VOT seen here may be the result of participants using a hyperarticulated "citation style" in the Baseline phase and becoming more familiar with the task in subsequent phases, or it could be the result of social divergence. Either way, the focus here is not on the direction of effect, but rather on the differences in degree of divergence across the three social

conditions. Table 2 shows an overview of the statistics of this model.

Fixed effect	Estimate	P value
Neutral Baseline VOT	**72.93**	**<0.001*** **
(Neutral) Exposure	**-9.55**	**<0.001*** **
(Neutral) Post	-0.35	0.71
Cis (Baseline)	5.75	0.26
Cis : Exposure	**-5.68**	**<0.001*** **
Cis : Post	**-9.23**	**<0.001*** **
Nonbinary (Baseline)	-4.20	0.41
Nonbinary : Exposure	**3.03**	**0.03***
Nonbinary : Post	-1.25	0.36
Initial Stop /p/	**-7.25**	**0.04***
Initial Stop /t/	7.16	0.09

Table 2: Results of the mixed effects model for shadowing task.

The reference level shows that the average VOT value for participants in the Baseline Phase of the Neutral condition was 72.93 ms. There is a significant main effect ($p < 0.001$) of Exposure phase for the Neutral condition, indicating that participant VOTs diverged from the model talker by *decreasing* by -9.55 ms. The interaction between Cis condition and Exposure phase shows a significant effect ($p < 0.001$), showing participants diverging even more in the Cis condition Exposure phase than in the Neutral condition Exposure phase (an additional -5.68 ms shorter, on top of the main effect of Exposure phase). The interaction between Cis condition and Post phase shows participants in the Cis condition maintaining their divergence ($p < 0.001$) in

the Post exposure phase, meaning that their divergence from the model talker persisted even beyond immediate exposure. The interaction between Nonbinary condition and Exposure phase (p = 0.03) shows participants in the Nonbinary condition still diverging (-9.55 main effect + 3.03 interaction effect = -6.52 ms), but significantly *less* than participants in the Neutral or Cis conditions. Finally, there is an expected significant main effect of initial stop, with /p/ showing significantly shorter VOT (p = 0.04, -7.25 ms).

4.3 Phonetic Imitation Discussion

This experiment examined VOT imitation effects in 45 American English speakers across three different experimental conditions with the prediction that nonbinary speakers would show stronger convergence when they were told the model speaker is also nonbinary (Nonbinary Condition) as compared to the other conditions. This prediction was based on previous observations that suggest the threat of being misgendered is a primary motivation for nonbinary speakers shifting their linguistic productions in differing social contexts (Gratton 2016, 2017). The results showed a surprising tendency for participants in all three conditions to diverge from, rather than converge with, the model speaker's VOT. Patterns of consistent divergence away from a model talker, like those seen in this study, highlight that phonetic imitation is not simply an automatic process, but instead mediated by social factors (Babel 2012, Pardo 2006, Pardo et al. 2018). For example, Babel (2012) found that male participants who rated a model talker as attractive were more likely to diverge from that talker's production. Babel posits that these participants "were, perhaps, *socially threatened* and distanced themselves in response to the threat" (emphasis mine). In this case, the difference in divergence across conditions also shows the strong influence of social factors. The results found that nonbinary participants diverged the

most in the Cis Condition (-9.23 ms, $p < 0.001$). I posit that nonbinary participants interpreted a social threat associated with a cis model talker, such as the threat of being misgendered (Gratton 2016, Konnelly 2021), which was strong enough to motivate participants to linguistically distance themselves from a cis-identified talker.

Additionally, VOT values from the Exposure Phase diverged the least in the Nonbinary Condition (3.03 ms, $p = 0.03$). Because the data is treatment coded, with the Neutral Condition as the reference level, the Nonbinary Exposure estimate of 3.03 ms must be added to the Neutral Exposure estimate of –9.55 ms which shows that the Exposure Phase of the Nonbinary Condition exhibited a decrease in VOT of –6.52 ms. Even with participants diverging in all conditions, these results suggest that nonbinary participants align their speech most closely to a model talker when they are explicitly identified as sharing a nonbinary identity. I interpret this that participants who are in an explicitly queer virtual setting, even a very low-interaction one, converge towards a shared nonbinary speech norm. These findings furthermore align with previous work which argued that in conversational speech in queer contexts, nonbinary speakers' pattern more like each other regardless of sex assigned at birth, effectively creating a distinct nonbinary speech community (Gratton 2016, Rechsteiner 2021).

5. DISCUSSION

5.1 A distinct nonbinary style

The research presented in this master's thesis examined sociophonetic variation in nonbinary speakers as a way of examining how gender and identity are constructed through linguistic means. The first study of this paper employed sociolinguistic interviews to analyze nonbinary speech production across topics, and the second study used a traditional shadowing task to see if the stated identity of the model speaker has an effect on nonbinary speaker's rates of phonetic imitation. These are important topics of inquiry because if we want to continue expanding sociolinguistic theories of gender, then sociolinguistic research needs to look outside the gender binary framework as a means of elucidating the linguistic machinations that underpin the production of gender stances.

The sociolinguistic interview study set out to build upon preexisting research on the speech patterns of individuals with nonbinary identities, specifically their use of the sociolinguistic variable (ING). Gratton (2016) showed that nonbinary individuals produce (ING) variants at different rates dependent upon the perceived external threat of the setting that the conversation took place; this study controlled for the setting of the interviews conducted in order to examine if deliberative and self-aware discussions on the topic of gender would affect participants variable use of (ING) when contrasted against other topics. The results showed that topic by itself does not influence participants' variable use of (ING), and while doing so the results brought another important observation to light – participants patterned similarly to each other regardless of their sex assigned at birth. Complementing these findings are the results from the shadowing task experiment, which show a trend for nonbinary speakers to converge toward a shared speech now when they are in an explicitly queer space as opposed to a neutral or cis

space. The discussion of the interview participants' discourses about gender in Section 3.3 makes an argument for viewing these participants as a community of practice which supports interpreting the results of these two studies as showing that nonbinary speakers have a speech style that is more likely to pattern with other nonbinary speakers in their network.

5.2 The impact of explicitly queer settings

The discourse analysis in Section 3.3 also showed that some nonbinary speakers qualitatively construct different personae using linguistic and semiotic means in queer spaces as opposed to non-queer spaces. Based on the information given by participants in interviews, this is primarily due to the perception that non-queer spaces contain more of a potential threat to individuals presenting a queer identity which is in line with the *threat of misgendering* motivation proposed by Gratton (2016, 2017). The phonetic shadowing study aimed to investigate the impact that model talker gender identity has on the direction and degree to which nonbinary speakers converge in VOT as a means of examining how nonbinary speakers may behave differently in an interactional setting that is explicitly queer compared to settings that are not explicitly queer. The results of the study found that compared to a model talker who is unlabeled for gender identity, a nonbinary model talker resulted in significantly less divergence for nonbinary participants. The study additionally found that a cis-labeled model talker resulted in significantly more divergence for nonbinary participants. These results suggest that even in low-interaction virtual settings, being in an explicitly queer context enables nonbinary speakers to pattern more like another nonbinary speaker than like a cis-identified speaker. Previous phonetic imitation studies have shown that speaker gender does not have a consistent, significant effect on imitation (Pardo 2006, Namy et al. 2002, Pardo et al. 2013). This is not to say,

however, that gender does not matter for imitation or convergence. Pardo (2006) noted that phonetic imitation "is subject to situational constraints that influence the direction and magnitude of phonetic convergence", and this is precisely what the findings of the current experiment show. Different situational contexts — in this case, whether nonbinary participants have entered an explicitly queer virtual environment or an explicitly heteronormative one — impact phonetic imitation. This suggests that explicitly queer spaces may enable the development of a distinct nonbinary style, potentially because nonbinary speakers engage in self-monitoring to a lesser degree when they are in queer spaces which allows for less phonetic divergence as well as the formation of a single speech community.

5.3 Revisiting gender in sociolinguistics

Labov (1990:p. 209) claims that "If we assign gender to our subjects by some other criterion than sex, we run the risk of losing any chance of replication by others". This statement captures a snapshot in time when sociolinguistic research was predicated on ideas of gender that are now outdated, but it also reflects possible contemporary anxieties that removing the gender binary from variationist analysis would make studies incomparable. However, sociolinguistic work on the patterns of binary gendered speakers who act similarly across macro-social speech communities is not nullified by analyzing the linguistic patterns produced by nonbinary and non-cis people. This point is further supported by the claim that "If we are interested in getting around either binary, we are not likely to do so entirely on the basis of large corpora, but through a variety of targeted ethnographic or, in some cases targeted survey, studies" (Eckert 2014). Conrod (2021) suggests that linguistic studies which ask about gender should carefully consider exactly what information is being collected and how that information is relevant to the research

question, so that researchers can avoid the harmful practice of implicit misgendering as well as protecting and respecting the people who participate in these studies. Additionally, Becker et al. (2022) noted that although their results seemed to support the idea that gender is a single spectrum with cis men and cis women on each end, they believe that theorizing gender in that way is ideologically under-representative of the complex nature of language variation and that it leads to the incorrect notion that nonbinary speakers must be acting within or in reaction to the gender binary.

5.4 Future research

Identities which are not captured by the categories of binary gender suggest that the expression of gender through linguistic means is an arena with much variation and that this variation can provide invaluable insight into the ways that speakers convey social meaning through their linguistic style. The sociolinguistic interview study was able to be performed by a member of the nonbinary community who was already a familiar acquaintance with the participants involved, but the number of participants was limited in size due to the scope of this research. Future studies should continue this work with nonbinary individuals to observe if this trend of nonbinary individuals continue to pattern similarly to each other across varying social backgrounds and experiences, as well as accounting for how these social backgrounds may influence and inform nonbinary individuals' production of gender. It would also be valuable for future research to examine if similar patterns are found with other dependent linguistic variables that have been seen to have gendered distributions in cis populations, such as sibilant contrasts, pitch, or discourse markers. The experimental results of the shadowing task also suggest that the social norms that emerge out of human interaction may actually be a little more abstract than the

human interaction itself which potentially has larger implications for what factors motivate linguistic accommodation in a general sense and investigating these motivating factors would be an interesting route of inquiry for future research. To continue expanding sociolinguistic theories of gender, research should continue to look outside the gender binary framework as a means of elucidating the linguistic machinations that underpin the production of gender stances.

BIBLIOGRAPHY

Babel, M. (2012). Evidence for phonetic and social selectivity in spontaneous phonetic imitation. *Journal of Phonetics, 40*(1), 177–189. https://doi.org/10.1016/j.wocn.2011.09.001

Becker, K. (2009). /r/ and the construction of place identity on New York City's Lower East Side. *Journal of Sociolinguistics, 13*(5), 634–658.

Becker, K., Khan, S., & Zimman, L. (2022). Beyond binary gender: Creaky voice, gender, and the variationist enterprise. *Language Variation and Change, 34*(2), 215-238. doi:10.1017/S0954394522000138

Boersma, P. & Weenink, D. (2022). Praat: doing phonetics by computer. Computer software.

Bradford, N. J., Rider, G. N., Catalpa, J. M., Morrow, Q. J., Berg, D. R., Spencer, K. G., & McGuire, J. K. (2019). Creating gender: A thematic analysis of genderqueer narratives. *International Journal of Transgenderism, 20*(2-3), 155-168. doi:10.1080/15532739.2018.1474516

Brysbaert, M. & New, B. (2009). Moving beyond Kucera and Francis: A critical evaluation of current word frequency norms and the introduction of a new and improved word frequency measure for American English. *Behavior Research Methods 41*(4). 977–990. Retrieved from https://link.springer.com/content/pdf/10.3758/BRM.41.4.977.pdf

Bybee, J. L. (2000). The Phonology of the Lexicon: Evidence from Lexical Diffusion. In M. Barlow & S. Kemmer (Eds.), *Usage-based models of language* (pp. 65–85). essay, CSLI Publications, Center for the Study of Language and Information.

Calder, J. (2021). Whose indexical field is it?: the role of community epistemology in indexing social meaning. *Proceedings of the 20th Meeting of the Texas Linguistics Society*.

Calder, J. & King, S. (2020). Intersections between Race, Place, and Gender in the Production of /s/. *University of Pennsylvania Working Papers in Linguistics, 26*(2), 31-38. Retrieved from https://repository.upenn.edu/pwpl/vol26/iss2/5

Campbell-Kibler, K. (2006). Variation and the listener: The contextual meanings of (ING). *University of Pennsylvania Working Papers in Linguistics, 12*(2), 53-64. Retrieved from https://repository.upenn.edu/pwpl/vol12/iss2/6

Campbell-Kibler, K. (2007). Accent, (ING), and the social logic of listener perceptions. *American Speech, 82*(1), 32-64. doi:10.1215/00031283-2007-002

Conrod, K. (2021). *How to ask gender in a linguistics study*. Medium. https://kconrod.medium.com/how-to-ask-gender-in-a-linguistics-study-da060291d3c8

Corwin, A. (2009). Language and gender variance: Constructing gender beyond the male/female binary. *Electronic Journal of Human Sexuality, 12*. Retrieved from http://www.ejhs.org/Volume12/Gender.htm

Darwin, H. (2017). Doing Gender Beyond the Binary: A Virtual Ethnography. *Symbolic Interaction*. doi:10.1002/symb.316.

Drager, K., Hay, J., & Walker, A. (2010). Pronounced rivalries: Attitudes and speech production. *Te Reo: Journal of the Linguistic Society of New Zealand, 53*, 27–53.

Eckert, P. (2014). The problem with binaries: Coding for gender and sexuality. *Language and Linguistics Compass, 8*(11), 529-535. doi:10.1111/lnc3.12113

Eckert, P., & McConnell-Ginet, S. (1992). Think practically and look locally: Language and gender as community-based practice. *Annual Review of Anthropology, 21*(1), 461-488. doi:10.1146/annurev.an.21.100192.002333

Enke, A. (2012). Introduction: Transfeminist perspectives. In *Transfeminist perspectives: In and beyond transgender and gender studies* (pp. 1-22). Philadelphia: Temple University Press. doi:https://www.jstor.org/stable/j.ctt14bt8sf

Fischer, J. L. (1958). Social influences on the choice of a Linguistic variant. *WORD, 14*(1), 47-56. doi:10.1080/00437956.1958.11659655

Fruehwald, J. (2012). Hand Coder Praat Script. Computer software.

Garmpi, A. (2020). *The Discursive Construction and Performance of Non-Binary Identity* (Unpublished master's dissertation). The University of Edinburgh.

Gasiorek, J., Giles, H., & Soliz, J. (2015). Accommodating new vistas. *Language & Communication, 41*, 1–5. https://doi.org/10.1016/j.langcom.2014.10.001

Gee, J. P. (2014). *How to do Discourse Analysis: A Toolkit*. Routledge.

Goldberg, A. E., & Kuvalanka, K. A. (2018). Navigating identity development and community belonging when "there are only two boxes to check": An exploratory study of nonbinary trans college students. *Journal of LGBT Youth, 15*(2), 106-131. doi:10.1080/19361653.2018.1429979

Goldinger, S. D. (1998). Echoes of echoes? An episodic theory of lexical access. *Psychological Review, 105*, 251–279.

Goldinger, S. D., & Azuma, T. (2004). Episodic memory in printed word naming. *Psychological Bulletin Review, 11*, 716–722

Gratton, C. (2016). "Resisting the Gender Binary: The Use of (ING) in the Construction of Non-binary Transgender Identities," *University of Pennsylvania Working Papers in Linguistics, 22*(2). Retrieved from https://repository.upenn.edu/pwpl/vol22/iss2/7

Gratton, C. (2017). *Nonbinary identity construction and intraspeaker variation*. The 91st Annual Meeting of the Linguistic Society of America, University of Texas at Austin. Retrieved academia.edu/30897570/Non_binary_Identity_Construction_and_Intraspeaker_Variation

Grieser, J. A. (2019). Investigating Topic-Based Style Shifting in the Classic Sociolinguistic Interview. *American Speech, 94*(1), 54–71. DOI: 10.1215/00031283-7322011

Grieser, J. A. (2022). *The Black Side of the River: Race, language, and belonging in Washington, DC*. Georgetown University Press.

Hazen, K. (2008). (ING): A Vernacular Baseline for English in Appalachia. *American Speech, 83*(2), 116–140. DOI: 10.1215/00031283-2008-008.

Houston, A. (1985). *Continuity and change in English morphology: The variable (ing)* (dissertation). University of Pennsylvania.

Kang, J. (2017). get_vot Praat Script. Computer software. www.github.com/HaskinsLabs/get_vot

Konnelly, L. (2021). Nuance and normativity in trans linguistic research. *Journal of Language and Sexuality, 10*(1), 71–82. https://doi.org/10.1075/jls.00016.kon

Labov, W. (1984). Field methods of the project on linguistic change and variation. In J. Baugh & J. Sherzer (eds.), *Language In Use* (pp. 28-53). Englewood Cliffs, NJ: Prentice Hall. Retrieved from https://www.ling.upenn.edu/~wlabov/L470/Labov1984.pdf

Labov, W. (1990). The intersection of sex and social class in the course of linguistic change. *Language Variation and Change, 2*(2), 205-254. doi:10.1017/s0954394500000338

Lakoff, R. (1973). Language and Woman's Place. *Language in Society, 2*(1), 45-80. Retrieved from http://www.jstor.org/stable/4166707

McAuliffe, M., Socolof, M., Mihuc, S., Wagner, M., & Sonderegger, M. (2017). Montreal forced Aligner: Trainable text-speech alignment using Kaldi. *Interspeech 2017*. https://doi.org/10.21437/interspeech.2017-1386

Namy, L. L., Nygaard, L. C., & Sauerteig, D. (2002). Gender differences in vocal accommodation: The role of perception. *Journal of Language and Social Psychology, 21*(4), 422–432. https://doi.org/10.1177/026192702237958

Nielsen, K. (2011). Specificity and abstractness of VOT Imitation. *Journal of Phonetics, 39*(2), 132–142. https://doi.org/10.1016/j.wocn.2010.12.007

Pardo, J. S. (2006). On phonetic convergence during conversational interaction. *Journal of the Acoustical Society of America*, 119, 2382–2393.

Pardo, J. S., Jordan, K., Mallari, R., Scanlon, C., & Lewandowski, E. (2013). Phonetic convergence in shadowed speech: The relation between acoustic and Perceptual Measures. *Journal of Memory and Language, 69*(3), 183–195. https://doi.org/10.1016/j.jml.2013.06.002

Pardo, J. S., Urmanche, A., Wilman, S., & Wiener, J. (2016). Phonetic convergence across

multiple measures and model talkers. *Attention, Perception, & Psychophysics, 79*(2), 637–659. https://doi.org/10.3758/s13414-016-1226-0

Pardo, J. S., Urmanche, A., Wilman, S., Wiener, J., Mason, N., Francis, K., & Ward, M. (2018). A comparison of phonetic convergence in conversational interaction and speech shadowing. *Journal of Phonetics, 69*, 1–11. https://doi.org/10.1016/j.wocn.2018.04.001

Peirce, J., Gray, J. R., Simpson, S., MacAskill, M., Höchenberger, R., Sogo, H., Kastman, E., & Lindeløv, J. K. (2019). Psychopy2: Experiments in behavior made easy. *Behavior Research Methods, 51*(1), 195–203. https://doi.org/10.3758/s13428-018-01193-y

Rankinen, W. (2014). The Michigan Upper Peninsula English Vowel System in Finnish American Communities in Marquette County. *American Speech, 89*, 312–347.

Rechsteiner, J. (2021). *Binary Opposition: Sociolinguistic Variation in Non-Binary Speakers* (thesis).

Reddy, S., & Stanford, J. (2015). A web application for automated dialect analysis. *Proceedings of the 2015 Conference of the North American Chapter of the Association for Computational Linguistics: Demonstrations*. https://doi.org/10.3115/v1/n15-3015

Schertz, J., Johnson, E. K., & Paquette-Smith, M. (2021). The independent contribution of voice onset time to perceptual metrics of convergence. *JASA Express Letters, 1*(4), 045205. https://doi.org/10.1121/10.0004373

Schertz, J., & Johnson, E. K. (2022). Voice onset time imitation in teens versus adults. *Journal of Speech, Language, and Hearing Research, 65*(5), 1839–1850. https://doi.org/10.1044/2022_jslhr-21-00460

Shockley, K., Sabadini, L., & Fowler, C. A. (2004). Imitation in shadowing words. *Perception & Psychophysics, 66*(3), 422–429. https://doi.org/10.3758/bf03194890

Shuy, R. W., Wolfram, W. A & Riley, W. K. (1968). *Linguistic Correlates of Social Stratification in Detroit Speech*. Final report, Cooperative Research Project Number 6-1347. Washington, D.C.: U.S. Dept. of Health, Education, and Welfare, Office of Education, Bureau of Research.

Steele, A. (2019). *Non-binary speech, race, and non-normative gender: Sociolinguistic style beyond the binary*. (Master's thesis). Retrieved from https://etd.ohiolink.edu/

Tagliamonte, S. A. (2004). Someth[in]'s go[ing] on!: Variable ing at ground zero. In Britt-Louise Gunnarsson, Lena Bergstrom, Gerd Eklund, Staffan Fidell, Lise H. Hansen, Angela Karstadt, Bengt Nordberg, Eva Sundergren and Mats Thelander (eds.), *Language Variation in Europe: papers from the Second International Conference on Language Variation in Europe, ICLAVE 2* Uppsala, Sweden, June 12-14, 2003.

Trudgill, P. (1972). Sex, covert prestige and linguistic change in the urban British English of Norwich. *Language in Society, 1*(2), 179-195. doi:10.1017/s0047404500000488

Wade, L. (2022). Experimental evidence for expectation-driven linguistic convergence. *Language*. https://doi.org/10.1353/lan.0.0257

Wan, T. L. A. (2021). *Topic-based variation of /ʂ/ and oral deaf speakers of Taiwan Mandarin*. UKLVC13.

Zimman, L. (2017). Gender as stylistic bricolage: Transmasculine voices and the relationship between fundamental frequency and /s/. *Language in Society*, *46*(3), 339-370. doi:10.1017/s0047404517000070

APPENDIX A: INTERVIEW MODULE GUIDE

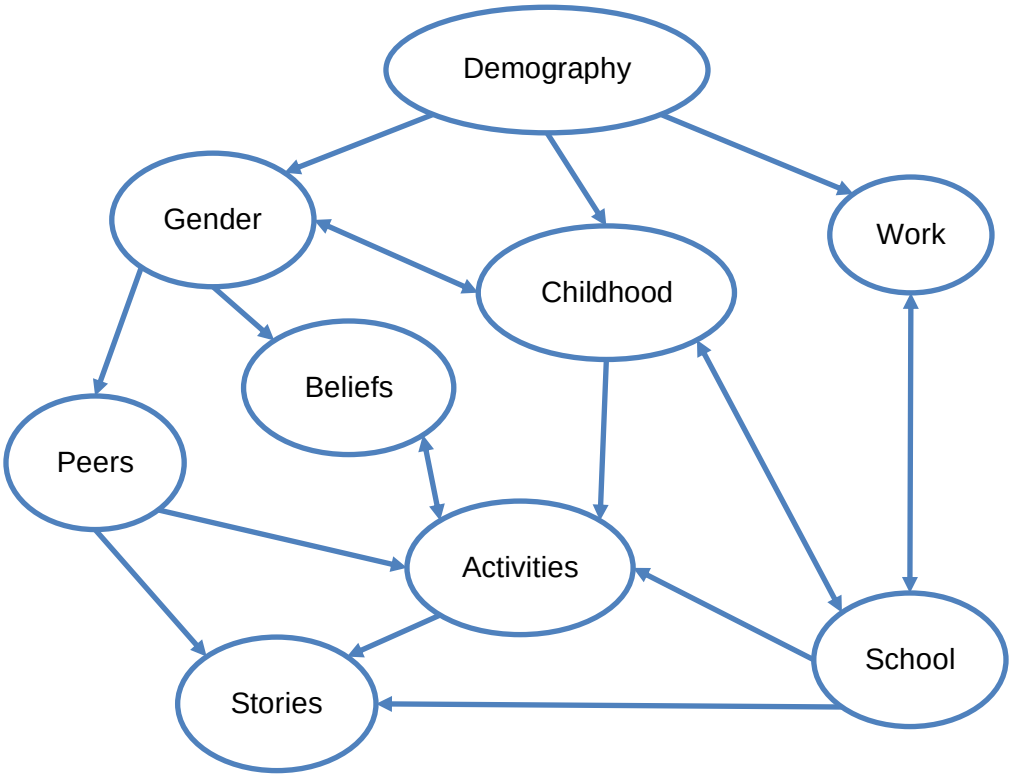

Figure 5: The modular interview guide used in the sociolinguistic interview study.

APPENDIX B: RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

Study Title: Sociophonetic variation in non-binary speakers
Researcher: Jack (Jacob) Rechsteiner
Department and Institution: Michigan State University College of Arts and Letters
Contact Information: rechste4@msu.edu

BRIEF SUMMARY
You are being asked to take part in a linguistics research study that will be conducted through the College of Arts and Letters at Michigan State University. I am doing this research for my senior thesis. The study is open to non-binary adults over the age of 18 who speak English.

PURPOSE OF RESEARCH
The purpose of the study is examining linguistic variation in speakers with non-binary gender identities.

WHAT YOU WILL BE ASKED TO DO
You will be asked to answer interview questions about yourself and your experiences. It should take about 45 minutes, but the interview may be longer or shorter depending upon how long you are willing to be interviewed.

PRIVACY AND CONFIDENTIALITY
The audio of this interview will be recorded. Only the research team will have access to any data containing personally identifying information so that your identity is kept confidential. In all written works produced using this data, you will be referred to with an anonymous ID, e.g. "Participant 1".

YOUR RIGHTS TO PARTICIPATE, SAY NO, OR WITHDRAW
Your participation in this research project is completely voluntary. You have the right to say no. You may change your mind at any time and withdraw. If you do not want to answer any of the questions, please let me know. You can also ask me to stop at any time.

COSTS AND COMPENSATION FOR BEING IN THE STUDY
There will be no financial compensation for your participation. There are no costs for your participation.

RESEARCH RESULTS
If you would like, I will email you about the results of the study once the study has concluded.

CONTACT INFORMATION
If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 4000 Collins Rd, Suite 136, Lansing, MI 48910.

If you have any concerns or questions before or after the interview about the research, you can contact the researcher, Jack Rechsteiner, at rechste4@msu.edu. You may also contact the research supervisor, Dr. Betsy Sneller at sneller7@msu.edu.

DOCUMENTATION OF INFORMED CONSENT

You indicate that you voluntarily agree to participate in this research study by proceeding with the interview.

APPENDIX C: SHADOWING TASK STIMULI

16 /k/	Frequency	16 /p/	Frequency	8 /t/	Frequency	14 filler	Frequency
carrot	3.82	penny	24.29	Tuesday	23.65	apple	23.67
castle	21.55	pinkie	1.67	turkey	22.61	orange	22.31
cabin	19.65	poker	16.06	tunnel	17.88	expert	22.12
camel	5.02	pollen	1.22	tofu	2.69	April	20.65
compass	4.06	popcorn	9.12	towel	14.16	iron	17.94
cancel	18.29	parent	13.14	tennis	13.63	exit	15.57
concert	17.55	peanut	12.35	timer	6.25	ankle	8.02
cookie	16.71	purple	12.33	tickle	4.80	eagle	11.49
carpet	11.65	picnic	11.69	*Mean*	13.21	intern	4.55
comic	10.82	pillow	11.39			oldest	9.37
cocoa	5.02	pencil	9.86			oven	8.88
collar	10.51	pepper	8.80			inning	2.51
cactus	2.90	password	7.98			onion	4.24
cannon	8.71	pirate	7.35			orbit	5.65
Congress	8.22	puzzle	7.33			*Mean*	12.64
candle	8.02	parrot	3.27				
Mean	10.78	*Mean*	9.87				

Table 3: The stimuli used in the VOT shadowing task, accompanied by their frequency per million and the mean frequency for each category.

APPENDIX D: INSTRUCTION SCRIPTS

Written instructions:

> *Thank you for agreeing to participate in this study. You will record yourself reading words from a list of words. You should say the word out loud as part of the phrase "The word is _____". For instance, if the word is "cat", you would say "The word is cat." To record your response, press the "Record" button. When you are finished, click "Next" to continue onto the next word. When you are ready to begin, press the spacebar on your keyboard.*

Audio instructions for the Nonbinary Condition:

> *Hello! My name is Sam. I am nonbinary and my pronouns are they/them. I am part of the MSU Sociolinguistics Lab. We are trying to determine differences in people speaking words with written instructions or spoken instructions. For the next section, the instructions will be the same but the words will be given to you out loud by me. You should repeat the word that I say by saying it out loud as part of the phrase "The word is BLANK". For instance, if I say the word "cat", you would respond by saying "The word is cat". Please do not begin your response until the recording of the word has finished. To record your response, press the "Record" button. When you are finished, click "Next" to continue onto the next word. When you are ready to begin, press the spacebar on your keyboard.*

Audio instructions for the Neutral Condition:

> *Hello! My name is Sam. I am part of the MSU Sociolinguistics Lab. We are trying to*

determine differences in people speaking words with written instructions or spoken instructions. For the next section, the instructions will be the same but the words will be given to you out loud by me. You should repeat the word that I say by saying it out loud as part of the phrase "The word is BLANK". For instance, if I say the word "cat", you would respond by saying "The word is cat". Please do not begin your response until the recording of the word has finished. To record your response, press the "Record" button. When you are finished, click "Next" to continue onto the next word. When you are ready to begin, press the spacebar on your keyboard.

Audio instructions for the Cis Condition:

Hello! My name is Grant and my pronouns are he/him. I am part of the MSU Sociolinguistics Lab. We are trying to determine differences in people speaking words with written instructions or spoken instructions. For the next section, the instructions will be the same but the words will be given to you out loud by me. You should repeat the word that I say by saying it out loud as part of the phrase "The word is BLANK". For instance, if I say the word "cat", you would respond by saying "The word is cat". Please do not begin your response until the recording of the word has finished. To record your response, press the "Record" button. When you are finished, click "Next" to continue onto the next word. When you are ready to begin, press the spacebar on your keyboard.