Sociophonetic Stratification of Punjabi Trans Women in Lahore

Mehak Saleem[1]

[1]M.Phil. Applied Linguistics, Research Scholar, Department of English Language and Literature, University of Management and Technology
Correspondence: MehakSaleem@live.com

Abstract

This study examines the role of voice in creation and negotiation of gender identity in trans women by carrying out a comparative analysis of the acoustic features (speaking fundamental frequency, formant frequency, loudness, breathiness, intonation and stress pattern) of the voice of trans women with the voice quality of cishet (person identifies as the gender they were assigned at birth) individuals. The analysis of the acoustic data shows that trans women have the measures of fundamental frequency and formants similar to cishet-men since they had similar biological characteristics of voice as male at birth; hence, they have lower pitch. Thus, trans women change vowel duration, intonation and stress pattern on syllable level to sound feminine. The interview data show that trans women use some vocal strategies to adjust their voices according to the expectations of gender roles in the society. Using interpretative phenomenological analysis (IPA), this study explores experiences of trans women with their voice and the use of different vocal strategies in creating a trans woman identity.

Keywords: Acoustic variables, Speaking Fundamental Frequency, Formants, Gender Identity

1. Introduction

1.1 Acoustic Properties of Transgender

This study focuses on the acoustic differences between trans women and cishet (person identifies as the gender they were assigned at birth) individuals to highlight the use of distinct acoustic cues by trans women in identity construction process. Zimman (2012) propounds that the difference of the voice is remarkably an important feature of gender presentation chiefly for those who are going through a transition process from one gender identity, role or presentation to another. Moreover, Hancock, Krissinger & Owen (2011) and McNeill, Wilson, Clark, & Deakin (2008) explain that the relationship of voice with transgender identification is an intricate phenomenon as transgenders' identity is incongruent with the sex, they were born with but their voice characteristics remain the same as of the sex they were assigned at birth. Likewise, Davies, Papp, & Antoni (2015) consider voice, the biologically vocal presentation, as the main impediment in establishing the new identity, particularly for trans women as speech therapy and feminizing hormones are not very helpful in feminizing the voice or alter

the established male vocal tract. Initial studies on trans women's voice focused on the difference in speaking fundamental frequency only.

Recently, the scope of study has extended to explore the complex and intimate relationship between acoustic cues and gender identity. Studies by Porter (2012), and Tielen (1992) on acoustic properties of transgenders' voice validate that different acoustic parameters i.e., voice quality; pitch, formants, breathiness, stress, and intonation are some of the determining factors in the perception and identification of gender.

This research is conducted in Pakistan where transgender in general is called hijra, khawaja sira, third sex or intersexed and male-to-female trans people, trans women, are called zankha with many other pejorative terms to mock their social and personal identity. They are subject to mental and sexual harassment and constant discrimination as a child in school till reaching adult life at their workplace leading them to quit their studies and jobs in most of the cases.

Jami and Kamal (2015) observed that a great number of trans women are rejected by their families because of the overwhelming sense of shame attached to them, so they seek shelter at local transgender community under the protection of their guru, leader, who provides emotional support to other group members and works as a trainer. This oppressed community, hence, tries to express their gender identity through linguistic and non-linguistic resources. Since voice is among the most salient cue to perceive gender, it has a remarkable importance in the experiences of transgender. Thus, this research is motivated by a desire to comprehend how trans women form their identity through their voice when biologically their voice is not congruent with their identity. It further attempts to explore the use of distinct acoustic cues by trans women to sound more feminine.

Previous studies on transgenders' voice have either emphasized predominantly on the effects of hormones on voice in trans women or trans men or the researches on trans women were limited to acoustic and perceptual measures only. Most of the studies done on transgender voice have focused on clinical treatment of these patients. The relationship of voice and identity of this community has been largely ignored with very few researches on the effect of the voice on their identity from a linguistic perspective ignoring the acoustic differences of trans and cis individuals. There is a dearth of work that explores the phonetic difference between trans and cis individuals' voices. Furthermore, no such study has ever been done in Punjabi language nor on Punjabi transgender in Pakistan.

1.2 Research Questions

The following research questions were addressed to explore the use of distinct acoustic cues by trans women in identity construction process.

- What are the most significant differences between the acoustic measures of physiologically determined characteristics of voice; pitch, speaking fundamental frequency (SFF), SFF variation and vowel formant in trans women, cismen and ciswomen?

- How are the suprasegmental aspects of speech; intonation and stress pattern different in trans women than cis individuals?

- Which vocal strategies do trans women consciously employ for the construction of their gender identity?

- How is the use of distinct phonetic features linked to speaker's transgender identity?

2. Review of the Related Literature

For this research, acoustic measures of Speaking Fundamental Frequency also known as pitch, SFF variation, vowel formants and intensity are calculated. Intonation and stress pattern of the participants are analysed using PRAAT. Pépiot (2015) establishes that pitch, an acoustic parameter, is a significant cue in gender perception. The length of vocal folds for biological female is nearly 12.5 mm to 17.5 mm; whereas, for a biological male the minimum length starts from 17.5 mm to approximately 24 mm. Due to the length of vocal folds, fundamental frequency or pitch of biological male is lower; resultantly, their voice is heavier than the voice of a biological female (Evans, Neave, & Wakelin, 2006; Puts, Hodges, Cárdenas, & Gaulin, 2007).

Studies in the area of gendered phonetics have given great importance to the identification of crossover point, after which the voices are no more perceived as male and start being perceived as female, (Koffi, 2019; Zimman, 2017; Hancock, Colton, & Douglas, 2014; McNeil, Wilson, Clark, & Deakin, 2008; Gelfer & Mikos, 2005; Ohara, 1999). 100 - 120 Hz is the average speaking fundamental frequency for men whereas 200 - 220 Hz is the SFF for women (Gelfer, Pickering, & Mordaunt, 2018; Berg, Fuchs, Wirknew, Loeffler, & Berger, 2017; Zimman, 2012; Simpson, 2009). Pickering and Greene (2018) and Hancock, Colton and Douglas (2014) noted that the range of 150 - 165 Hz is the crossover point for trans women.

The pharynx to mouth ratio between male and female varies as the average length of mouth of a woman is 85% more than that of the average male; whereas, the average length of pharynx in women is only 77% that of the average male (Sundberg, 1987, p. 102, citing Nordström, 1977) hence, biological male has lower formant frequencies as compared to biological female.

The duration of vowel in speech is another potential difference in identification of gender. It is more related to articulatory pattern rather than physiological restriction. Several studies have provided the evidence that female tend to produce longer vowel than male speakers (Holt, Jacewics, & Fox, 2015; Martin, 1995; Simpson, 1998). Another possible justification for these results is the study by Byrd (1992, 1994) which explored that women speak slower than men; hence, they produce longer vowels. Nonetheless, there are some languages where gender-based vowel pattern is not consistent e.g., the study of Swedish and American English by Simpson and Ericdotter (2003) provided the empirical evidence that there is no significant difference between vowel duration in male and female. Another study conducted by Neel (2008) concludes that there was no significant difference in duration ratio of vowel between men and women.

Individuals can consciously alter their suprasegmental features of speech like rhythm, intonation and stress pattern. Resultantly, these features are not affected by the physiological differences between male and female but considered as the elements of sociolinguistic style. Wolfe, Ratusnik, Smith and Northrop (1990) conducted a study on trans women, cismale and cisfemale to explore their intonation contours, the results showed that those trans women who used a higher number of variations in their pitch; upward, downward, and level contours were perceived as female than those who were perceived as male with more monotonous pitch. Study conducted by Günzburger (1993) explored that trans women, when asked to produce two different types of sound, tended to read slowly and carefully in their female voice which resulted in more intonation contours. Wollitzer (1994) observed that those trans women who show more upward intonation contours are perceived as female but some of them show more exaggerated intonation shifts in trying to copy cisfemale.

3. Methodology

This research aims at exploring the acoustic differences between trans women and cis individuals to find out the relationship between the voices of trans and cis individuals. It further aims at discovering the role of trans women's conscious efforts in altering the phonetic features to construct their unique identity.

3.1 Theoretical Framework

This study is drawn on the concept of a conversational semi-structured interview, which was then analysed using interpretative phenomenological analysis (IPA) to get the insight into trans women's experience of their voice from their point of view. This approach helps to explore how individuals make sense of the phenomenon and their experience of it. According to Hegel, phenomenology is a form of conscious knowledge that is linked with saying what is perceived, sensed and known from a person's experience (Moustakas, 1994). Like Hegel's description of phenomenology, Lauer (1967) stressed that the unique source of absolute existence is based on what the person thinks, feels, and perceives. For Moustakas, phenomenon is nothing but "what appears in the consciousness" (p. 26). Patton (2002) explains that the aim of interpretative phenomenological analysis is to understand and clarify the deep meanings, structure, and essence of lived experience of a person or group of people. This approach allows the researcher to seek the perceptions of participants who have experienced a phenomenon - in this case, the relationship of trans women's voice with their identity. Researchers strive to create structure to understand realities of research participants without imposing themselves on the participants (Boss, Dahl, & Kaplan, 1996). Broadly, the purpose of the phenomenological study is to comprehend and describe a specific phenomenon extensively and endeavor to reach to the meaning and depth of the essence of the participants' lived experience of the phenomenon.

Interpretative phenomenology emerges as an appropriate framework for this study as it is a participant-oriented approach. Alase (2017) elaborates the utilization of the IPA approach in a qualitative research that it enables the researcher to understand and describe the lived experience of participants without any distortion. Hence, it is a suitable framework to understand the relationship of trans women with their voice and attain the essence of this phenomenon with reference to trans women's lived experience of using their voice to form their identity.

Hence, the interview data is analysed by following all the important principles of phenomenological research e.g. epoche - to relinquish biases and preconceived ideas about the phenomenon and look at the topic with a fresh eye; phenomenological reduction - bracketing statements also called "horizons" by Moustakas (1994) are grouped into themes; textural descriptions - the textural descriptions give the 'what' of the experience in a transcendental phenomenological study as participant's own words are included in order to convey their unique perceptions of the phenomenon investigated; imaginative variation - in this step, the textural description is revised from different perspectives to describe the essential structure of the phenomenon; and synthesis (revised themes and structural description) to look for different thematic

meanings regarding trans women's experience with their voice which emerged through various experiential accounts (Van Manen, 1990).

3.2 Research Design

This sociophonetic study examines the use of phonetic variants by trans women in identity construction process by using a mixed methods analysis of data incorporating quantitative acoustic analysis by comparing acoustic and suprasegmental aspects of speech of trans women with cismen and ciswomen. The qualitative analysis is based on the subsequent interviews which are analysed using interpretative phenomenological analysis to explore the understanding and level of awareness of trans women individuals about their voice and the way they use distinct linguistic features to construct their unique identity.

3.3 Data Collection

Recordings of the study sample, that includes ten trans women individuals (mean age of 27 years, range = 20-38) and a group of ten cisgender male (mean age of 28 years, range = 21-42) and ten cisgender females (mean age of 25 years, range = 20-36), were made. Trans women were recruited through LGBT Non-governmental organizations by using snowball sampling and purposive sampling technique. To analyse the acoustic properties of the voice, a reading passage was provided to the participants. Each target vowel was embedded in a Punjabi word at initial (onset), medial (peak) and final (coda) positions. These words were also recorded in isolation to measure the acoustic properties separately. All recordings were done in a recording studio, using Boya wireless microphone and Zoom Pro audio recorder. After recording the speech samples of thirty participants using 44100 Hz sampling frequency, the files were converted to 24 bits .wav files and saved with the assigned number and letter. The passage was sent to the participants through an email before the recording day to practice. They were given the opportunity to record it when they are available and feel comfortable in recording their voice. Further instruction was given to trans women participants to use the voice which they use to present their gender.

Before conducting each interview, the researcher asked each participant about their language preferences as Punjabi is the first language of all the trans women participants and the researcher also wanted the participants to be able to express themselves the way they feel most comfortable. Eight interviews were conducted in Urdu and two in Punjabi.

After recording the speech samples, the researcher conducted semi-structured interviews with the trans women participants that consisted of open-ended questions

regarding each participant's experience of their voice in their daily life and how they feel about their voice. Some questions also addressed the relationship of their voice with their gender presentation. The researcher interviewed all the participants individually so that the presence of other trans women may not affect the responses of the participants.

4. Acoustic Data Analysis

The dependent variables in this study incorporated the following acoustic variables: vowel formant frequency [resonance], F1 bandwidth, speaking fundamental frequency (F0) [pitch], min SFF, max SFF, F1, F2, F3, variation [intonation], and vocal intensity [loudness], each of these are significant for gender identification. The analysis of these acoustic measurements is based on a set of 30 tokens of 10 vowels (three tokens of each of the Punjabi vowels). The words carrying target vowels were isolated using the trim function and dead air was deleted in the computer-based editing software, Adobe Audition. The individual words were transcribed using the *textgrid* function in PRAAT. Ten vowels each at initial (onset), medial (peak) and final (coda) positions were isolated from the words.

Minimum, maximum and mean Speaking Fundamental Frequency, SFF, and its variation were calculated as it helps to measure the speaker's normal speaking pitch and pitch range. Praat's built-in Linear Predictive Coding (LPC) algorithms were used as a tool to calculate the measurements. Settings were time step: 0.01. The minimum floor selected was 120 Hz for women, 70 Hz for men and 75 Hz for transwomen, with a ceiling of 300 Hz for women, men and transwomen. Fundamental frequency is the average rate of vocal fold vibration (Hixon, Weismer, & Holt, 2018). These measures were calculated using Praat. Each vowel sound was analysed to calculate first three formants i.e., F1, F2, F3. A vowel has many formants, but F1, F2 and F3 are of paramount importance as F1 correlates with the height of the tongue, F2 with the tongue retraction and F3 with the roundness of the lips. Hence, these formants help to distinguish one vowel from another and help to measure speaker's pitch. In this study, first three formants, F1, F2 and F3 were measured by selecting a midpoint window of 48 ms and extracting it. The settings were time step 0.0, for 4 formants, and a maximum of 5500 Hz for women, 5500 Hz for transwomen and 5000 Hz for men, with a window length of .024.

The bandwidth (BW) of *F*1 was measured too due to its relationship to the presence of breathiness in the vowel - i.e., the greater the first formant bandwidth, the greater the amount of breathiness in the sound (Hixon, et al, 2018). Moreover, vocal intensity, that is a physical correlate of loudness, was measured in decibels of the level

of sound pressure from connected speech samples of the participants. It was measured using Praat's automatic functions for each segment.

The data gathered by measuring the acoustic properties of the participants were then comparatively analysed using SPSS version 25.0.0.0. *t-tests* were performed to determine the significance value (p) which shows the differences between the transwomen's voice quality with the voice quality of cismen and ciswomen.

4.1 Findings

Table 1

Mean acoustic variables and p value comparing acoustic measures of transwomen with cismen and ciswomen

Acoustic measures	Trans women (n=10)	Cismen (n=10)	Significance (*p*)	Ciswomen (n=10)	Significance (*p*)
Duration (ms)	146.5	127.7	0.051	157.4	0.058
SFF (Hz)	136.6	131.1	0.048	240.6	0.064
SFF min (Hz)	115.5	120	0.046	197.2	0.061
SFF max (Hz)	159.2	141.6	0.043	289.8	0.068
SFF SD (Hz)	10.925	5.4	0.058	23.15	0.063
F1(Hz)	404.1	397.5	0.049	551.4	0.089
F2(Hz)	1509.3	1498.1	0.046	1865.2	0.055
F3(Hz)	2559.4	2522.6	0.039	2988.5	0.070
F1 BW Breathiness	125.4	114.8	0.041	163.1	0.085
Intensity (dB)	68.4	70.4	0.049	66.6	0.055

Graph 1

Overview of the difference of measures between transwomen, cismen and ciswomen
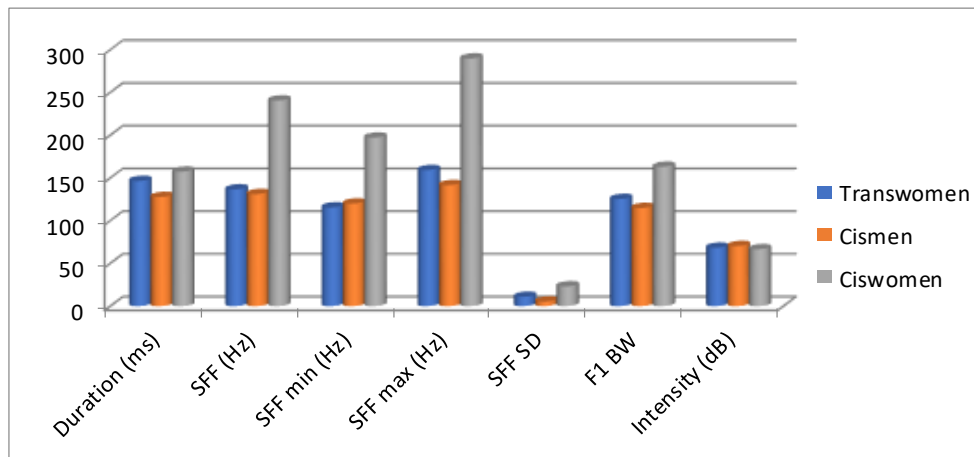
Graph 2

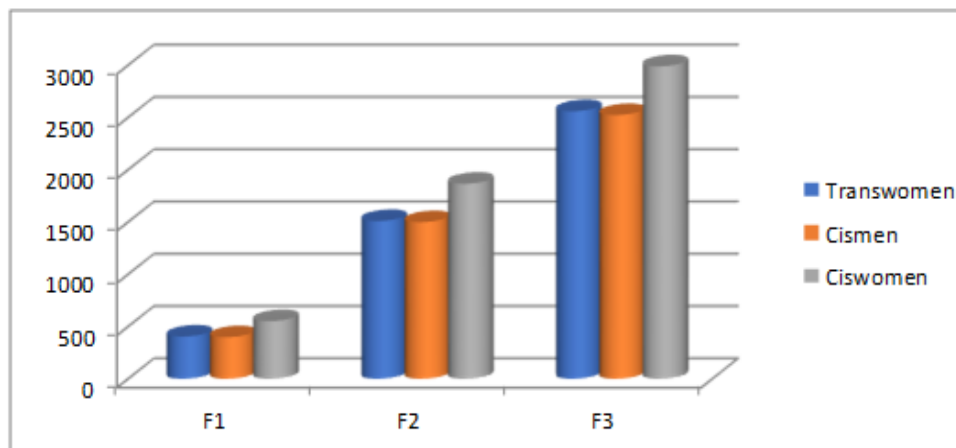*Overview of the difference of F1, F2, F3 measures between transwomen, cismen and ciswomen*

Table 1 and Graph 1 and 2 present mean measures of acoustic variables for each group. The data reveals that the measures of SFF, SFF min, SFF max, F1, F2, F3, and F1 BW of trans women are not different than cismen. The data revealed that the comparisons between the values of acoustic variables of trans women and cismen, at a significant level (*p*) of 0.05 and below, have shown no statistically significant differences between the voices. Whereas at a significant level of 0.510, there is

statistically significant difference between the vowel duration of trans women and cismen.

The statistical analysis in Table 1 shows that there is a statistically significant difference in the acoustic measures of trans women and ciswomen as all the significance (*p*) values are over 0.05. Thus, by comparing the results, it is revealed that there is statistically no significant difference between the acoustic measures of trans women and cismen; whereas, there is a statistically significant difference between the measures of trans women and ciswomen.

SFF SD was calculated to analyse intonation pattern. With the mean SFF SD value of 10.92, trans women have higher variation in speaking fundamental frequency as compared to cismen. Nevertheless, these are still very lower than ciswomen. This reveals that trans women try to change their pitch which results in very slight change.
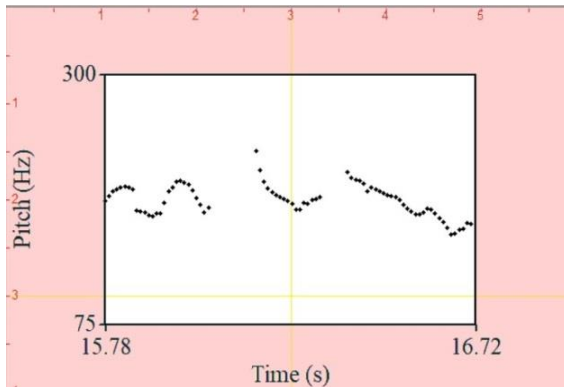

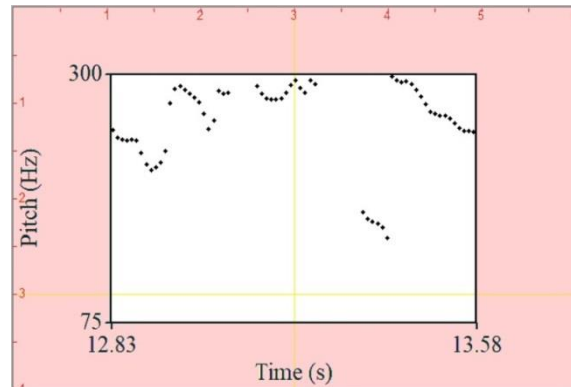Figure 1: Variation in pitch contour (intonation) in trans women's speech

Figure 2: Variation in pitch contour (intonation) in ciswomen's speech
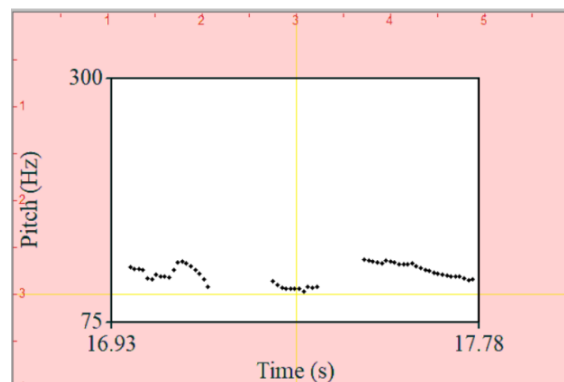
Figure 3: Variation in pitch contour (intonation) in cismen's speech

Figure 1 shows the variation in pitch contour in trans women. It reveals that trans women try to control the rise and fall of the pitch to sound more like ciswomen. But their pitch is very lower as compared to ciswomen giving less room to use a varied pitch. Figure 2 shows the variation in pitch contour in ciswomen. It reveals that ciswomen have a varied intonation pattern with high and low pattern. The range of min and max F0 is also greater which results in more varied pitch contour. Figure 3 shows the variation in pitch contour in cismen. It reveals that cismen have somewhat linear intonation pattern with very little variation in pitch contour. Since cismen have very low F0 and the range of min and max F0 is very less therefore, the pitch contour pattern is not varied.

The figures reveal that women appear to show a greater pitch range and within this range they tend to vary the pitch more frequently. Figure 3 reveals that cismen tend to speak monotonous with very little variation in pitch and using more falling pattern. Ciswomen use different intonation patterns within a range with more upwards pattern. On the other hand, trans women try to change the intonation pattern but due to lesser F0 range, the contours are not varied like ciswomen although they try to vary the pitch within that lesser pitch range. Vowel duration, intensity and pitch are correlates of stress. The data revealed that trans women have lower pitch, F0 as compared to ciswomen but they tend to lengthen the duration of the vowel to sound feminine. Moreover, the results of acoustic measurements show that trans women try to speak softer which results in lesser intensity as compared to cismen. Hence, duration and intensity help them in achieving more stress or prominence on syllables.

5. Qualitative Data Analysis

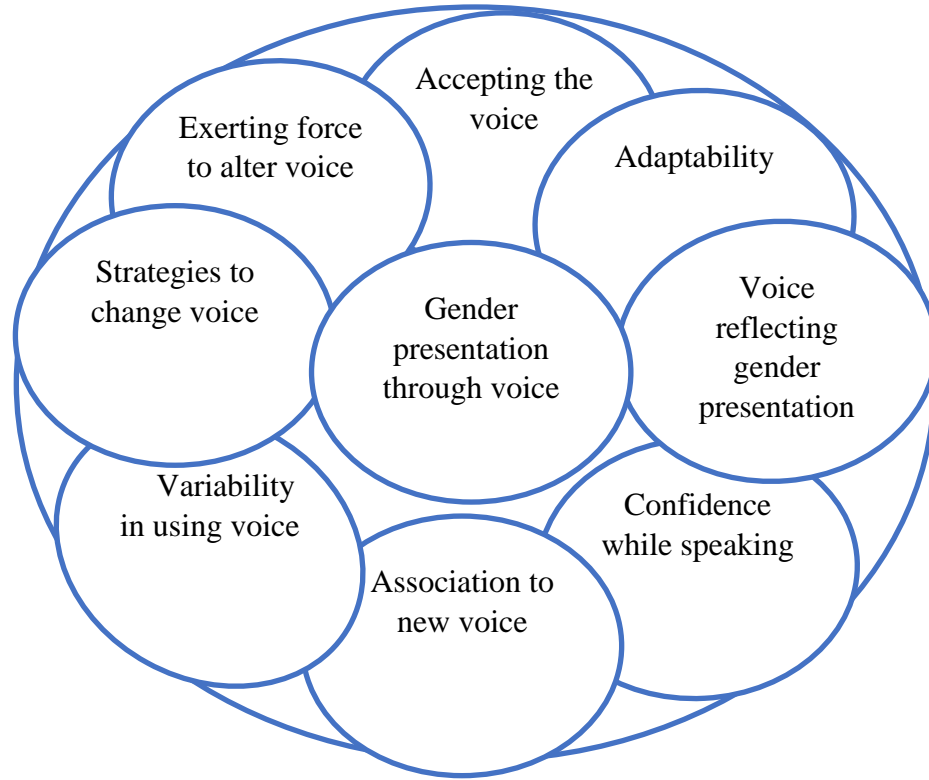Eight core themes emerged from analysis of the interview data of ten trans women participants which are as follows:

Figure 4: Core themes emerged from the IPA of the interview data

5.1 Accepting the voice

The respondents shared that they are very positive about their voice since it gives them the sense of ownership. People perceive them as female when they talk, and they believe that's the most fulfilling part. Participant 2, 4 and 10 reported that they are comfortable with the voice they have now and they do not want to sound exactly like female. Participant 8 expressed her experience with her voice:

شروع میں میرے لیے اپنی آواز کو قبول کرنا مشکل تھا۔ پہلے میری آواز مختلف تھی۔ پھر آہستہ آہستہ میری آواز بدلتی گئی۔ اب میں اپنی آواز سے خوش ہوں۔

Initially it was hard for me to accept my voice which was different than what I have now but gradually it changed- Now, I am happy with my voice. (Participant 8)

Participant 9 is aware of the fact that her voice is not exactly like a female and she has accepted that reality but she wishes to change her voice if she gets the chance. Participant 10 shared that she never had to struggle to change her voice as her voice had female like characteristics from puberty.

5.2 Adaptability

Participants reported that they feel a change in their voice after they started presenting themselves as female. For them, their voice has female characteristics now that makes them happy. They shared that it is the result of the strategies that they use shared by their guru.

میرے عورت ہونے کے ساتھ میری آواز بھی ویسی ہو گئی ہے۔ مجھے اب اپنی آواز مختلف لگتی ہے۔ جب سے میں نے

عورت کی طرح رہنا شروع کیا ہے۔ مجھے اپنی آواز پسند ہے اور لوگ بھی مجھ سے فون پر عورت ہی سمجھ کر بات کرتے ہیں۔

My voice has adapted to my new gender role. I feel a change in my
voice after I have started presenting myself as a female. I like my voice
and people take me as a female when I talk to them over the phone.
(Participant 1, 3)

Participants explained that they do not find any difficulty in adjusting their voice according to the situation. They can present their voice in both ways: male and female. They reported that they would place more emphasis on maintaining their female in the situations where they want to be identified as female.

5.3 Voice reflecting gender presentation

The respondents explained that their new voice presents their unique gender identity which is not exactly like female but people do recognize them and take them as female. Participant 4 and 5 take pride in their voice that represents them as trans women.

جب میں نے اپنے آپکو عورت کی بجائے ایک خواجہ سرا کے طور پر دکھانا شروع کیا، تب سے میری آواز جیسی بھی ہے میں اس

سے خوش ہوں۔

When I started identifying more as trans woman, rather than a female, I
became more comfortable with wherever my voice is at. (Participant 4)

مجھے معلوم ہے کہ میں ایک مکمل عورت نہیں ہوں اور سچ میں میں ویسی آواز چاہتی بھی نہیں۔ لیکن میں بہت سے ادبی اجلاس

میں بھی جاتی ہوں تو میں وہاں ویسے ہی بولتی ہوں جو اصل میں ہوں جو میں ہوں وہ ہی مجھے دکھائے۔

I know that I am not a cisfemale and honestly I do not want to sound
exactly like a female; but, I do attend different seminars and for this I
want to adjust my voice to that level where I feel my voice fully
reflects who I am. (Participant 5)

For participant 6, 7 and 10, their voice is exactly like a female and it is congruent with how they present themselves.

5.4 Confidence while speaking

Participants shared that they can relate to their voice as it has given them pride. People take them as female because of their voice which boosts their confidence. Participant 5, who thinks that her voice does not fully represent her, reported that she hesitates to speak in front of the people outside their community. Taking her as a male reduces her self-confidence.

<div dir="rtl">

میں ابھی اپنی آواز کو لے کر اتنا پر اعتماد نہیں ہوں کیونکہ مجھے ابھی اپنی آواز پر کام کرنا ہے۔ میں اپنی آواز بدلنے کی کوشش کرتی ہوں لیکن ایسے بولتے ہوئے بہت طاقت لگتی ہے۔

</div>

I still don't feel that confident because I need to work more on my voice. I try to alter my voice but the force which I exert most of the time drains my energy.

The interviewees also reported that they feel more confident when they sing as the rise and fall of their voice makes them sound exactly like a female. This is a strategy which they feel has helped them in embracing their voice.

5.5 Association to new voice

Participants feel a strong connection to their new voice. They reported that they have to exert force to alter their voice but it does help them in creating their new identity.

<div dir="rtl">

سچی میں، میں جو ہوں میری آواز بھی ویسی ہی ہے۔اور یہ ہی میرے لیے اپنائیت ہے۔ مجھے اپنی نئی آواز پسند ہے۔

</div>

Honestly, this voice represents who I am actually and this gives me a sense of belonging. I like my new voice. (Participant 2)

<div dir="rtl">

حالانکہ مجھے آواز بدلنے کے لئے بہت طاقت لگانی پڑتی ہے لیکن اس سے میری آواز ایسی ہی لگتی ہے جیسی میں ہوں۔ جب لوگ مجھے میری آواز کہ وجہ سے عورت ہی لیتے ہیں تو میں زیادہ پراعتماد محسوس کرتی ہوں۔

</div>

Even though I exert force to sound like a female, I feel this voice represents my gender identity and I feel more confident when people perceive me a female due to this voice. (Participant 3 & 4)

Two of the interviewees reported that they still feel they need to work more and they don't feel that their current voice represents them who they actually are. For them, they feel less associated with their voice which is not male or female.

5.6 Variability in using voice

The respondents explained that their voice was hoarse like men initially before they met the members of their community. Now after they have learnt the strategies to sound like female, they can easily feel the change in their voice. They reported that their voice is creakier now like female.

<div dir="rtl">
آواز بدلنے کے لیے میں نے کچھ سیشن لیے جس سے میری آواز کی بہت سی چیزیں بدلیں۔ اب میں جس جگہ چاہوں، آدمی اور کچھ حد تک عورت کی طرح بھی بول سکتی ہوں ۔
</div>

Taking voice therapy sessions has helped me in changing different aspects of my voice. I can speak in both male and some-what female voice now wherever I want. (Participant 2)

Participant 9 feels that she has to put in more effort but the results do not satisfy her as she is most of the times taken as a male.

<div dir="rtl">
جب میں طاقت لگاتی ہوں تو میں عورت کی طرح بولتی ہوں ، ہاں بلکل عورت کو طرح نہیں۔ ایسا کرنے سے بہت کم فرق پڑتا ہے اور میں اپنی آواز کو اور بدلنا چاہتی ہوں۔
</div>

When I exert force then my voice sounds feminine but not completely. It seems that there is only a slight change in my voice and I want to change it more. (Participant 9)

5.7 Strategies to change voice

The interviewees shared many strategies which they have learnt from their guru and community members. Most of them also use different mediums to learn the strategies. They reported that they use fennel seeds and liquorice to soften their voice. Their guru asked them to put in greater force when speak. They lengthen the word and give more stress on the words.

<div dir="rtl">
میرے گرو نے بولتے ہوئے زیادہ طاقت لگانے اور دھیان سی الفاظ کو بولنے اور لمبا کرنے کو بولا۔ میں بولتے ہوئے اپنی آواز کو دیکھتی ہوں اور الفاظ پر زور دیتی ہوں۔
</div>

> My guru asked me to put in greater force when speak, carefully pronounce the words and lengthen them. I monitor my voice and give stress on words. (Participant 2, 6, 8)

They also copy the style of female singers, which they feel is a useful strategy to change their voice.

میں شیشے کے سامنے کھڑے ہو کر اپنی آواز کو مختلف طرح بولتی ہوں اکثر۔ کبھی کبھی میں کچھ الفاظ پر زیادہ زور دیتی ہوں اور اونچے سر سے گاتی ہوں۔

> I try to use my voice in different ways by practicing in front of the mirror; sometimes I put more stress on some words and sing in a higher tone. (Participant 6)

The participants reported that they also watch videos and copy the style shared by the instructor. The participants shared that they carefully monitor their voice and give stress on the words, this is the strategy which they have learnt by observing cisfemale and imitating them. They believe that they have learnt a lot by watching actresses in the movies, it made them familiar with the ways female speak.

5.8 Exerting force to alter voice

The respondents explained that they have to exert more force when they give more stress on words and speak with a burst like female. They are aware of the fact that their pitch is not very high, for this they do exert more force when they take out air while speaking. They feel they sometimes cannot control their voice when they run out of air.

میں بولتے ہوئے اپنی آواز پر توجہ دیتی ہوں۔ لازمی بات ہے آواز کو توجہ سے بدلنے کے لیے میں زیادہ طاقت لگاتی ہوں۔

> I do pay attention when I speak, and for that I obviously do exert more force to carefully alter the voice (Participant 7).

But most of the older participants, reported that they are used to it now and it feels like a part of them. They speak the same way with the outsiders and the people from their own community.

5.9 Thematic Discussion

Participant 1 believes that she is successful in *presenting her gender through her voice*. Participant 2 experiences unpredictability about her voice as it has both male and

female characteristics. She has *accepted* the fact that she needs to continue taking voice therapy sessions to alter her voice to that extend which *presents her trans identity through her voice*. Participant 3 exerts a significant amount of *effort* in order to *present her voice* the way she wants to. Participant 4 feels *self-acceptance* towards both her masculinity and femininity. She is aware of the fact that her voice is different from cisfemale but she believes that it has shown *variation* since she started identifying as a trans woman. Although Participant 5 does not want to sound exact like a cisfemale, but she desires to have a voice which *reflects her trans woman identity*. Participant 6 acknowledges that singing songs helped her in knowing the characteristics of her voice which resulted in using her voice to *present her gender*. Participant 7 is quite successful in *presenting her gender through voice* by carefully monitoring her voice and *exerting force* where required. For Participant 8, her current voice is natural as it has been 10 years since she has started *presenting* her as a trans woman. Participant 9 experiences a lack of *confidence* due to her *unpredictable* voice. She feels she needs to take voice therapy sessions (which she cannot afford at the moment) to *present* her trans women identity through her voice. Participant 10views her voice as a deciding factor in *presenting* her gender.

Participant 1 believes her voice has *adapted* to her new gender role. This *variation* has brought more *confidence* in her; although, she has to exert *force* in order to give more stress and to lengthen the words which are a few *strategies* she learnt from her guru to alter her voice according to her new gender. As Participant 2 relearns to use her voice, she has become more *confident*, and feels optimistic in *adapting* her voice that *reflects her gender presentation*. Now, she tries to exert *force* to alter her voice with quite few other voices changing *strategies* that she learns from her voice therapist. Participant 3 uses *voice altering strategies* other than taking fennel seeds, liquorice and other herbs to soften her voice. She believes that she is successful in *adapting* her voice to her new gender role which has helped her in bringing more *confidence* in her. Participant 4 also has to exert a significant amount of *effort* in order to alter her voice along with some other voice altering *strategies*. Participant 5 shows awareness of the characteristics of her voice. She watches YouTube videos to learn the *strategies* which could help her in altering her voice. She exerts *effort* to make her voice sound feminine. Participant 6 is aware of the fact that her voice had shown unpredictability and *variation* until she met her guru who made her learn some *voice altering strategies*. She *accepts* that she has to *exert force* to alter her voice but it seems so automatic now. Participant 7 uses *voice altering strategies* to sound more feminine. She believes that she is successful in *adapting* her voice to her new gender role which has helped her in bringing more *confidence* in her. Participant 8 does not need to *exert force* as it is all automatic for her. Initially, she started using *voice altering strategies* other than taking fennel seeds, liquorice and other herbs to soften her voice. She believes that she is

successful in *adapting* her voice to her new gender role which has helped her in bringing more *confidence* in her. Participant 9 feels that she has to exert a significant amount of *force* to alter her voice along with other voice changing strategies. Participant 10 claims that she never had to use any *voice altering strategy* or *exert force* to sound feminine as her voice was already feminine from the start. She is extremely *confident* about it and feels that her voice gave her confidence to come out as a trans woman.

6. Conclusion

This study explored that the physiologically determined acoustic properties of trans women's voice are similar to cismen's voice as trans women have the same physiological characteristics as biological men. The measures of SFF, SFF min, SFF max, F1, F2, F3, and F1 BW of trans women were similar to cismen. The findings from the personal accounts of trans women provided insight into the use of voice in the identity construction process. Out of the many strategies which trans women use to change their voice, one is lengthening the duration of vowels to give more stress; thereby, changing the suprasegmental aspect of their voice. A difference in trans women's intensity was also measured. Intensity is a correlate to loudness of voice which, with little effort, trans women change to alter their voice. Thus, this study explored that duration and intensity are two variables which trans women consciously change. The pitch contours revealed that trans women also try to use varied pitch patterns although the minimum and maximum pitch range is not as greater as ciswomen, still the contour patterns are dissimilar than the monotonous pattern of cismale.

This is the first study in Punjabi language which explores the acoustic differences between trans and cis gendered voices. There is no study ever done on Punjabi transgender which combines phonetics and phenomenological analysis to analyse the complex relationship of voice and identity. Nonetheless, there are several limitations to the generalizability of this study. First, the results of this study are based on a relatively small sample size. Moreover, the study looked at gendered identity in a fairly narrowly-defined social landscape predominantly in Lahore. Furthermore, the quantitative analysis was only limited to acoustic measurements without including listeners' rating of the voice which helps in understanding the relationship of different acoustic variables in perception of gender. Despite the aforementioned limitations, this study will serve as a stepping stone for future researches to investigate the complex relationship of voice and gender.

References

Alase, A. (2017). The interpretative phenomenological analysis (IPA): A guide to a good qualitative research approach. *International Journal of Education and Literacy Studies*, *5*(2), 9-19.

Berg, M., Fuchs, M., Wirkner, K., Loeffler, M., Engel, C., & Berger, T. (2017). The speaking voice in the general population: normative data and associations to sociodemographic and lifestyle factors. *Journal of Voice*, *31*(2), 257-313.

Boss P, Dahl C, Kaplan L. The use of phenomenology for family therapy research. In: Sprenkle DH, Moon SM, editors. *Research methods in family therapy.* Guilford Press; New York, NY: 1996. pp. 83–106.

Byrd, D. (1994). Relations of sex and dialect to reduction. *Speech Communication*, *15*(1-2), 39-54.

Byrd, D. (1992). Preliminary results on speaker-dependent variation in the TIMIT database. *The Journal of the Acoustical Society of America*, *92*(1), 593-596.

Cain Porter, C. (2012). *Voice Quality and Gender Identification: Acoustic and Perceptual Analysis.* [Master Dissertation]. Dalhousie University Halifax, Nova Scotia.

Davies, S., Papp, V. G., & Antoni, C. (2015). Voice and communication change for gender nonconforming individuals: Giving voice to the person inside. *International Journal of Transgenderism*, *16*(3), 117-159.

Evans, S., Neave, N., & Wakelin, D. (2006). Relationships between vocal characteristics and body size and shape in human males: an evolutionary explanation for a deep male voice. *Biological psychology*, *72*(2), 160-163.

Gelfer, M. P., Pickering, J., & Mordaunt, M. (2019). Pitch and Intonation. In R. K. Adler, S. Hirsch, & J. Pickering (Eds.). *Voice and Communication Therapy for the Transgender/Gender Diverse Client: A Comprehensive Clinical Guide* (3rd edition). San Diego: Plural Publishing.

Gelfer, M. P., & Mikos, V. A. (2005). The relative contributions of speaking fundamental frequency and formant frequencies to gender identification based on isolated vowels. *Journal of Voice*, *19*(4), 544-554.

Günzburger, D. (1993). An acoustic analysis and some perceptual data concerning voice change in male-female trans-sexuals. *International Journal of Language & Communication Disorders*, *28*(1), 13-21.

Hancock, A., Colton, L., & Douglas, F. (2014). Intonation and gender perception: Applications for transgender speakers. *Journal of Voice*, *28*(2), 203-209

Hancock, A. B., Krissinger, J., & Owen, K. (2011). Voice perceptions and quality of life of transgender people. *Journal of Voice*, *25*(5), 553-558.

Hixon, T. Weismer, G., & Holt, J. (2018). Chapter 7: Acoustic theory of vowel production. In Hixon, T. J., Weismer, G., & Hoit, J *Preclinical speech science: Anatomy, physiology, acoustics, and perception*. San Diego, CA: Plural Publishing.

Holt, Y. F., Jacewicz, E., & Fox, R. A. (2015). Variation in vowel duration among southern African American English speakers. *American journal of speech-language pathology*, *24*(3), 460-469.

Jami, H., & Kamal, A. (2015). Measuring attitudes toward hijras in Pakistan: Gender and religiosity in perspective. *Pakistan Journal of Psychological Research*, *30*(1).

Koffi, E. (2019). A Comprehensive Review of F0 and its Various Correlations. *Linguistic Portfolios*, *8*(1), 2.

Lauer, Q. (1967). On evidence. In *J. J. Kockelmans (Ed.), Phenomenology* (pp. 83-105). Garden City, NY: Doubleday

Martin, P. (1995). The opposition between /E/ and /E:/ in current Quebec French. *La Linguistique, 34*(2):33-45

McNeill, E. J., Wilson, J. A., Clark, S., & Deakin, J. (2008). Perception of voice in the transgender client. *Journal of Voice*, *22*(6), 727-733.

Moustakas, C. (1994). *Phenomenological Research Methods*. Thousand Oaks, CA: Sage Publications.

Neel, A. T. (2008). Vowel space characteristics and vowel identification accuracy. *Journal of Speech, Language, and Hearing Research*.

Ohara, Y. (1999). Performing gender through voice pitch: A cross-cultural analysis of Japanese and American English. In *Wahrnehmung und Herstellung von Geschlecht* (pp. 105-116). VS Verlag für Sozialwissenschaften.

Patton, M. Q. (2002). Two decades of developments in qualitative inquiry: A personal, experiential perspective. *Qualitative social work*, *1*(3), 261-283.

Pépiot, E. (2015). Voice, Speech and Gender: Male-Female Acoustic Differences and Cross-Language Variation in English and French Speakers. *XVèmes Rencontres Jeunes Chercheurs* de l'ED 268, Paris, France.

Pickering, J., & Greene, M. (2018). Voice and Communication Modification: Historical Perspective. In Adler, R. K., Hirsch, S., & Pickering, J. (Eds.), *Voice and Communication Therapy for the Transgender/Gender Diverse Client: A Comprehensive Clinical Guide*, 3rd ed. San Diego, CA: Plural Publishing.

Puts, D. A., Hodges, C. R., Cárdenas, R. A., & Gaulin, S. J. (2007). Men's voices as dominance signals: vocal fundamental and formant frequencies influence dominance attributions among men. *Evolution and Human Behavior*, *28*(5), 340-344.

Simpson, A. P. (1998). *Phonetische Datenbanken des Deutschen in der empirischen Sprachforschung und der phonologischen Theoriebildung.* Arbeitsberichte des Instituts für Phonetik und digitale Sprachverarbeitung der Universität Kiel (AIPUK) 33.

Simpson, A. P., & Ericsdotter, C. (2003). Sex-specific durational differences in English and Swedish. In *Proceedings of the 15th International Congress of Phonetic Sciences.* Barcelona: 1113–1116.

Simpson, A. P. (2009). Phonetic differences between male and female speech. *Language and linguistics compass*, *3*(2), 621-640.

Sundberg, J., & Thomas, D. R. (1987). *The Science of the Singing Voice.* DeKalb: Northern Illinois University.

Tielen, M. J. T. (1992). *Male and female speech. An experimental study of sex-related voice and pronunciation characteristics.* PhD dissertation, University of Amsterdam.

Van Manen, M. (1990). Beyond assumptions: Shifting the limits of action research. *Theory into practice*, *29*(3), 152-157.

Wolfe, V. I., Ratusnik, D. L., Smith, F. H., & Northrop, G. (1990). Intonation and fundamental frequency in male-to-female transsexuals. *Journal of Speech and Hearing Disorders*, *55*(1), 43-50.

Wollitzer, L. C. (1994). *Acoustic and perceptual cues to gender identification: A study of transsexual voice and speech characteristics*. (Doctoral dissertation). University of British Columbia, Vancouver.

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

Zimman, L. (2012). *Voices in Transition: Testosterone, Transmasculinity, and the Gendered Voice among Female-to-Male Transgender People.* (Unpublished doctoral dissertation). University of Colorado, Boulder, CO.

Appendix A

Vowels in Shahmukhi Punjabi with examples in word – initial, medial and final positions

iː	**a**ː
ایمان	آدمی
اوہدیاں	زنانی
بالڑی	کہندا

ʊ	**ə**
اچّی	اج
دکھ	ایدھر
کھوہ	ملیا

uː	**e**ː
اوٹ	ایدھر/ایمن

دوجی	میرے
مینوں	تے

<u>O:</u>	<u>ε:</u>
اوہ/اوتھے	ایہہ
موقع	کہندا
اکو	بہہ/اکہہ

<u>ɔ:</u>	<u>I</u>
اوکھی	اکو
سوتن	ملیا
-------	اودھی

Appendix B

Paragraph

اج اوہ آدمی کھوہ تے مینوں ملیا تے کہندا ایمان ، علی دی دوجی زنانی اج کل بڑی اچی ہواؤاں اچ اے ۔ میرے نال وی بڑی اوکھی ہو کر ملدی اے ۔ اوہدیاں ایہہ اوٹ پٹانگ حرکتاں توں اودھی سوتن وی تنگ اے ۔ اکو اودھی بالڑی اے ۔ ایدھر کوئی دکھ سکھ دا موقع ہویا نئیں اگلیاں بوہا کھولیا، گڈی اچ بہہ تے چل لہور۔

Aj o aadmi khoo tay menoo milya tay kehnda Emaan, Ali di dooji zanani aj kal bari uchi hawawan ich ay. Meray naal ve bari okhi ho ker mildi a. Odhiyaan a oot patang harkatan to odhi soutane ve bari tang a. Ikko odhi balri a. Edhar koi dukh such da moqa hoya nahe, agliyaa'n buha kholya, gaddi ich beh, tay chal Lahore.