

‘This app can help you change your voice’: Authenticity and authority in mobile applications for transgender voice training

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Abstract

Mobile applications for transgender voice training seek to help trans people alter their speaking voices, often with the goal of alignment with one or another pole of binary gender expression (i.e., voice ‘feminization’ or ‘masculinization’). These apps offer instruction, audio tools and feedback mechanisms that allow users to record, evaluate and track their progress relative to a desired – and gendered – goal. As with digital technologies generally, however, these apps draw on and reproduce particular ideas of both the needs and capacities of imagined users and broader social and political phenomena – in this case, voice, gender expression and gender transition. In the following paper, we undertake a critical discourse analysis of five mobile voice training apps for transgender people. We find that rather than offering expansive or open-ended conceptions of gender, these apps reproduce ideals of gender as not only binary but also white, affluent and able-bodied. We also offer a critique of the apps’ characterization of transition as reifying the normative authority of clinical and technoscientific knowledge and conditioning ‘authenticity’ on an ability to conform to (racialized, classed and ableist) binary gender norms.

Keywords

Mobile applications, transgender people, transnormativity, voice training

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Introduction

Transgender voice training aims to help trans people alter their speaking voices, often with the goal of alignment with one or another pole of binary gender expression (i.e., voice ‘feminization’ or ‘masculinization’). For some, this entails formal voice training with licensed speech pathologists. Others pursue voice training through alternative (and often more affordable) resources, including digital technologies and services. Trans people who have access to the Internet or a smartphone, for example, can find active communities that distribute guides, share tips and provide feedback and support (such as on Reddit; see [Kowalchuk, 2020](#)). Those seeking more formal digital instruction, however, can turn to mobile applications specifically designed for transgender voice training available for both Android and iOS devices. These apps offer guided tutorials, specialized audio tools and active feedback mechanisms that record, evaluate and track users’ progress relative to particular gendered goals. More broadly, these mobile voice training applications are part of a broader landscape of ‘technologies of transition’ – that is, those various biomedical and other technologies that trans and gender non-conforming people may access to alter their bodies ([Billingsley, 2015](#): 2). Within that landscape, voice training apps can also be understood as *digital* technologies of transition that supplement, supplant or circulate alongside other (especially biomedical) technologies, providing trans and gender non-conforming people with additional or alternative resources for altering one’s body or appearance. As with digital technologies generally, however, these apps are hardly empty conduits for action or expression. Rather, they shape and condition – through a combination of (hyper)textual, visual, interactive and other elements – the formation of particular subjects, especially along the lines of race and gender ([Nakamura, 2008](#)). In this paper, we examine five mobile voice training apps for transgender people, paying particular attention to the discursive construction of voice, gender expression, and gender transition. We begin by situating mobile voice training applications relative to work in digital and media studies, sound studies, trans studies and social computing. Once situated, we introduce and describe the specific apps in our study, as well as our methods for data collection and analysis. We then provide an overview and critical discussion of the apps and the gendered, racialized, and other ideals of voices, bodies and identities they encode and reproduce. We argue that rather than offering expansive or open-ended conceptions of gender, we show how these apps reproduce ideals of gender as not only binary but also white, affluent and able-bodied. We also show how the most robust apps reify an ideal of transition as a transformative journey toward a fixed endpoint of ‘true’ gender and authentic selfhood – with authenticity defined, in part, by submission to the normative authority of clinical and technoscientific knowledge. Drawing on Aren Aizura’s discussion of transnormativity and ‘the elsewhere’ of transition, we argue that voice training apps reflect broader cultural efforts to normalize trans subjects by eliminating gender indeterminacy and making social inclusion contingent one’s ability to hew closely to (racialized, classed and ableist) ideals of binary gender. In this way, voice training apps are more than just digital artifacts to study and critique – they also represent sites of struggle over the cultural understandings of gender transition, the limits of trans technological design and the possibility of gender self-determination.

Situating and studying mobile voice training applications for transgender people

Examining mobile voice training applications for trans and gender non-conforming people means hearkening to multiple, sometimes distinct literatures. As digital applications for mobile computing devices, they invite discursive and other analyses familiar to, for example, digital studies and internet research ([Light et al., 2018](#); [van Dijck, 2013](#)). As tools for converting vocal expression into

data to be measured, visualized and tracked over time, they also evoke work on the ‘quantified self’ (Lupton, 2016) and the ‘datafication’ of self-knowledge (Ruckenstein and Schüll, 2017). As ‘apps’, they speak to mobile computing’s pervasive role in mediating social and personal relationships (Baym, 2015), informing norms of communication and expression (Linke, 2013), and facilitating embodied and other engagements with digital media (Richardson and Hjorth, 2019). As apps designed for transgender and gender non-conforming people specifically, they also point toward research in social computing and design that seeks to both better understand diverse user experiences and develop technologies that are responsive to them (Ahmed et al., 2020; Haimson et al., 2020). It also calls out to the emerging domain of ‘digital trans studies’, which explores the uses and consequences of digital and networked technologies for transgender and non-binary people (Haimson, 2021).¹

In a different register, an analysis of voice training apps could also set out from an account of the relationship between voice and gender broadly. Conceptually and practically, ‘voice’ is intimately bound up with ideals of identity, selfhood and the body. Through the processes of speaking and listening, voice acts as a ‘medium that extends the communicative capacity of the body over a distance’ (Alper, 2017). Importantly, however, the production and perception of different voices is mediated by social, cultural and historical conditions – including meanings and norms of gender expression. In limited binary terms, for example, lower pitched voices tend to be attributed to adult men and masculinity while higher pitched voices are attributed to adult women and femininity. More than reductive indicators of certain physiological differences, however, these differences have been classically associated (in Western contexts, at least) with patriarchal ideals connecting lower pitched ‘masculine’ voices with greater capacities for rationality and self-control (Carson, 1995). Conversely, higher pitched voices have often been associated with ‘not men’, that is, with persons ‘who [fall] short of full masculine subjectivity’, including (but not limited to) women, children and boys or men considered effeminate or otherwise deviant (Geffen, 2021). These associations resonate with contemporary stereotypes of lower pitched voices as ‘commanding’ and higher pitched ones as ‘weak’ or ‘shrill’.

The importance of normative expectations of gendered voices reverberates across social and cultural depictions of trans and gender non-conforming people. For example, the idea that voices can be sorted into more or less distinct categories of binary gender (e.g., ‘men sound like this while women sound like that’) contributes to what Talia Mae Bettcher (2014) calls the ‘wrong-body’ problem: the idea that trans bodies are deficient, deviant or abhorrent in ways that must be corrected (socially, medically or otherwise). Conceptions of trans voices as deviant or ‘wrong’ are pervasive in popular representations of transgender people, especially transgender women. In the notorious 1970 song ‘Lola’ performed by English rock band The Kinks, for example, the titular character is described as someone who ‘walked like a woman but talked like a man’ (The Kinks, 1970).² In the 1980s and 1990s, producers of popular ‘trashy’ talk shows would often rely on people’s voices to mark queer and trans guests as different or deviant. For example, trans women featured on these shows have recounted being asked to use a ‘deeper voice’ or speak in a lower register on screen (Gamson, 1999). Similarly, the 2007 ABC primetime soap *Dirty Sexy Money* introduced the character of Carmelita—a transgender character played by trans actress Candis Cayne—digitally manipulating her first spoken line to make her voice sound deeper than Cayne’s actual speaking voice (Disclosure, 2020). These examples are indicative of a stylized dissonance between voice and appearance used to represent trans subjects, especially trans women (Davis, 2009). The effect is to mark trans women as deviant or fake compared to ‘real’ (i.e., cisgender) women – or, worse, to frame them as deceitful and fraudulent men (Bettcher, 2007; Richards, 2017; see also: Billard, 2019).

Taken together, these different accounts can help us make sense of the affordances of mobile voice training applications as a ‘technology of transition’ (Billingsley, 2015: 2) that informs and mediates trans people’s social and physical lives. Most broadly, voice training includes tools and techniques designed to alter or modify the acoustic, phonetic or other qualities of one’s voice including (but not limited to) pitch, resonance and/or cadence. Such alterations may be especially desired by those who experience their voice as a source of dysphoria, anxiety or distress.³ For some, altering one’s voice may include: hormone therapy (especially testosterone) or surgery (like glottoplasty) to change the size and shape of one’s vocal cords, vocal therapy with a licensed speech language pathologist, or self-study via instructional videos, online tutorials or trans-specific voice training applications. In the US context, access to hormones, surgery or more formal therapies for altering one’s voice is difficult and out of reach for many. Even for those with stable or reliable health insurance, insurance companies and healthcare providers routinely draw lines between procedures and those deemed merely cosmetic. Specifically, voice interventions are not consistently deemed ‘medically necessary’ and eligible for coverage.

Trans people may also seek to alter their voices for social reasons or as a strategic response to precarious or violent conditions. Most pointedly, having a voice that does not conform with normative gender expectations can compromise a person’s social, economic or physical security. In many contexts, being marked or ‘clocked’ as trans can increase a trans person’s already heightened vulnerability to harm – especially for trans women of color (James, et al., 2016). As trans activist and community leader Miss Major Griffin-Gracy puts it: ‘my girls are not going to pass that easy.... Women, even the cis women, have all these criteria that they have to meet to be OK’ (Griffin-Gracy et al., 2017: 32). For many trans people, this heightened vulnerability to harm may issue from a lack of access to appropriate health care, routine discrimination in housing and employment, various forms of disenfranchisement and dispossession, active degradation in popular media, as well as physical violence and death.

Trans people have long maintained networks of peer support and resources. For example, early ‘passing guides’ were ‘an important source of experiential knowledge’ that surfaced and codified the so-called ‘natural’ speech characteristics of cisgender men and women (Pennington, 2019). Later, trans-led projects like *Finding Your Female Voice*, a mail order instructional video series originally available on VHS or DVD, made such guidance commercially available (Deep Stealth Productions, 2002).⁴ At the same time, trans people are also often innovators and active adopters of new technologies for peer support and information exchange, especially digital and networked technologies (Haimson et al., 2021; Whittle, 1998). Online, trans people find, create and circulate health- and voice-related information in various ways, from sharing text-based documents that describe vocal exercises to fostering more interactive communities where trans people have real-time discussions, exchange audio recordings and host live training sessions (see: Ahmed, 2018; Augustaitis et al., 2021; Kowalchuk, 2020).

Voice training for transgender people has also been taken up by researchers and clinical practitioners in the field of speech language pathology. Adler et al. (2006) published the first ‘comprehensive clinical guide’ for speech therapists working with trans clients, with subsequent editions in 2012 and 2018. Though highly influential in the practice of trans speech therapy, these clinical guides reproduce a limited and deterministic conception of the voice typical of research on gender differences in the voice generally. As Zimman (2018) notes, phonetic research on gender and voices often takes physiology and ‘biological sex’ as the primary or essential factor in gendered voice differentiation. Such work also tends to operationalize gender as a flat binary (i.e., ‘male’ and ‘female’) that takes white and middle-class subjects to represent women and men generally (Zimman, 2018: 3).

Crucially, however, the limits and ideological assumptions of clinical approaches to trans voices have not gone unremarked. In research contexts, trans scholars have challenged the ‘flippant indulgences’ of both traditional and queer linguistics that treat trans subjects as curiosities while holding up disciplinary norms hostile to trans researchers (Zimman, 2021). These efforts underscore the fact that within academic and clinical research settings trans people are considerably more likely to be research subjects than researchers themselves (Zimman, 2017: 340). Outside the academy, trans people have countered clinical hegemony by developing communities and resources around voice training that simultaneously challenge the pathologization of gender difference (Ahmed et al., 2020). Conversely, some trans people actively resist the idea that one must bring one’s voice into alignment with normative (cis)gender expectations; defying gendered expectations through voice can be both pleasurable and a form of protest (Anastasia, 2014: 262–263). Informed by these and other critical projects, the remainder of this paper takes up mobile voice training applications as not only (or not merely) digital artifacts to study, but also as part of a broader backdrop of sites and services against which struggles for gender self-determination and trans liberation are cast.

Methods

For this study, we examined five mobile voice training applications.⁵ We began by installing the apps on two different devices (one running Apple iOS, the other running Android) and documenting them according to the walkthrough method for studying technical and semiotic elements of mobile computing applications (Light et al., 2018). Importantly, the walkthrough method emphasizes a ‘step-by-step’ process of ‘observation and documentation of an app’s screens, features and flows of activity—slowing down [an app’s] mundane actions and interactions... to make them salient and therefore available for critical analysis’ (Light et al., 2018: 882). Our ‘step-by-step’ documentation process revolved around the ‘phases of interaction’ outlined by the method: entry (i.e., initiating use, including onboarding for new users), everyday use (i.e., regular interaction with an app’s features), and disconnection (i.e., discontinuing use, either temporarily or permanently). Documentation took the form of screenshot images of apps’ various on-screen displays, including static pages and more dynamic feedback provided during vocal exercises. In total, we collected more than 400 images.

Once collected, we coded and analyzed the screenshots following the method of Critical Discourse Analysis, or CDA (van Leeuwen, 2008).⁶ On this account, CDA attends to the ways social practices – understood as ‘socially regulated ways of doing things’ – are represented and reproduced in texts (van Leeuwen, 2008). As a critical method, it is attuned to questions of power and representation, including the ways individual or collective behaviors, bodies or identities are presented as legitimate (or not) within particular accounts of social practices (van Leeuwen, 2008). CDA’s attention to power and practice is well-suited to studying social norms relative to the design and use of digital technologies (Brock, 2018: 1019–1020). Following these commitments, we collaboratively developed a coding scheme informed by both our preliminary walkthroughs and an analytic focus on conceptions of gender and voice. We then used the qualitative research software ATLAS.ti to manually code each screenshot, labeling app elements according to their (explicit and implicit) articulations of gendered norms, as well as associated ideals of race, class and ability. Questions or issues that arose during coding were deliberated and, where necessary, the coding scheme was revised. Presentation of our analysis below begins with an overview of the apps following the walkthrough method’s focus on phases of interaction, including: finding the apps, opening them, exploring their functions, using them and disconnecting from them. For the sake of space, this overview also contains some preliminary discussion of salient features, relevant esthetic qualities and other items of note. Following this overview, we offer an extended discussion of three

themes that build on and critically deepen findings from the preliminary overview. We then conclude with a brief summary and final reflection.⁸

Finding and using mobile voice training applications

People looking for mobile applications for voice training are largely confined to offerings in two mobile app stores: the Apple App Store (for apps approved for use on Apple's mobile and tablet operating systems) and the Google Play Store (for apps compatible with the open-source Android operating system). Within each app store, we performed multiple keyword searches to identify relevant apps, including 'trans voice app', 'transgender voice app' and 'transgender voice training'. These initial searches yielded 11 potentially relevant applications by five developers. Notably, however, searches that did not include the keywords 'training' or 'app' were dominated by results for novelty voice modulator apps, echoing transphobic discourses that position trans people as deceptive 'fakers' (Bettcher, 2007) or curiosities (Marvin, 2020). This finding resonates with previous work on gender, sexuality and algorithmic bias in app stores (see: Ananny, 2011; Cannon, 2021).

Of the 11 eligible apps, we narrowed our focus to the most current and robust applications by each company, setting aside defunct and legacy apps.⁹ Our final list contained five applications from four developers: two versions of the Exceptional Voice App ('Eva') produced by VoxPop, LLC ('EvaF' for trans women and 'EvaM' for trans men); Christella VoiceUp from Speech Tools Ltd.; Voice Pitch Analyzer from Purr Programming; and OperaVox Lite from OperaVOX Ltd.¹⁰ Notably, Voice Pitch Analyzer and OperaVox Lite are more sparse, general purpose voice analysis apps focused almost exclusively on measuring pitch. Nonetheless, both apps cited trans voice training as a possible use case in their app store descriptions. By contrast, the Eva and Christella VoiceUp (henceforth 'VoiceUp') are more robust and are explicitly designed for voice training for transgender people. Although all the apps we studied were free to download and install, most required users to purchase in-app voice lesson modules. The cost is variable and, for many, significant: VoiceUp's three available lessons are \$14.99 USD each, EvaF has 20 lessons for \$79.99 USD (which cannot be purchased individually), and EvaM offers five lessons for \$3.99 USD each.

Upon opening each app, users are greeted with evocative images and color schemes. EvaF opens onto an image of a full-body shot of a white woman with wavy light-colored hair and wearing a flowing white dress; the image features a lavender-to-pink gradient overlay and the woman is walking along a beach, gazing out over a body of water. EvaM opens onto a tighter, head-and-shoulders shot of a man wearing a suit, tie and fedora-like hat; the image features a green-to-blue gradient overlay and the man has suggestively pulled the hat down over his face. In both cases, the person's face is obscured, leaving users open to project themselves into the image. Clicking on the apps' informational pages, users learn more about the people behind them. For the Eva apps, the 'About Eva' section displays four options: Disclaimer, About Eva, About Kathe Perez and Feedback. The disclaimer is brief, describing the apps as 'general in nature' and not a substitute for 'training [sic] from a qualified professional'. The 'About Eva' page gives users information on the structure of courses, pricing, and provides directions for joining a Web-based 'online learning community'. 'About Kathe Perez' features a headshot of the app's creator, and establishes her credentials as 'a speech-language pathologist...for more than 30 years'. Switching into a more empathetic mode, the app addresses the user directly, noting that 'as a transgender person, you're aware that your voice is not an accurate reflection of who you really are' before detailing a story of Kathe Perez meeting a transgender woman in the 1990s who 'inspired' her to develop her 'acclaimed voice feminization programs'. The EvaM app expands on this origin story, explaining that

after mostly coaching trans women, Perez ‘wondered where the guys were’. EvaM then recounts a story of Perez meeting with a trans man in 2009 who taught her the ‘unique concerns trans* masculine (and gender queer [sic] people) have regarding [their] communication and voice’ (Figure 1).

Christella VoiceUp greets users with a green, pink, and white interface featuring a headshot of the titular ‘Christella’, a light-skinned woman with shoulder-length curly brown hair wearing a smart blouse and necklace typical of a professional workplace. Her picture is set next to the text prompt ‘Find out how Christella can help you find your feminine voice’. Other prompts direct the user to track the feminization of ‘your voice’, to restore a previous purchase, or to select from three stages of voice lessons. Though less obvious than Eva’s background images, these menu items feature images that further contextualize voice feminization; for example, the ‘My Voice’ module features a close up photograph of a face with smooth white skin and painted red lips. Exploring the app further, users can tap the ‘Find out’ prompt and watch an introductory video, where Christella Antoni introduces herself and establishes her credentials by noting she has been ‘helping transgender individuals modify their voices’ for ‘more than 20 years’. The tone throughout is less empathetic and more clinical than in the Eva apps; the descriptions are direct and task-oriented, emphasizing skills acquisition, confidence building and consistent practice so that ‘this app can help you change your voice’.

In contrast to the Eva and VoiceUp apps, the more sparse pitch analyzer apps open onto more abstract images. Voice Pitch Analyzer features a cartoon picture of a microphone above a short ‘Quickstart Guide’ and prompt to ‘Start Recording’. Clicking the prompt directs users to read a random snippet of text aloud for 1 minute (though the app does not make explicit the source of the snippets, we recognized them as excerpts from Oscar Wilde’s *The Picture of Dorian Gray*). After reading, users are presented with feedback placing their voice pitch (in Hertz¹¹) on a graph with a low end labeled ‘Male Range (85–180 Hz)’, a mid-line labeled ‘Androgynous’, and a high end labeled ‘Female Range (165–255 Hz)’ (see Figure 2, left). From the home screen one can also click on ‘Premium’ to get information on a paid version of the app that allows users to upload their own text, modify color schemes and change the app’s icon. OperaVox Lite features illustrations of a human eye and human mouth next to prompts to ‘Analyse Voice’ and ‘View Analyses’, respectively. Tapping on the lips gives users multiple options for measuring pitch, phonation, and range. Tapping on the eye takes users to a locally stored history of their exercise results. Notably, there are no

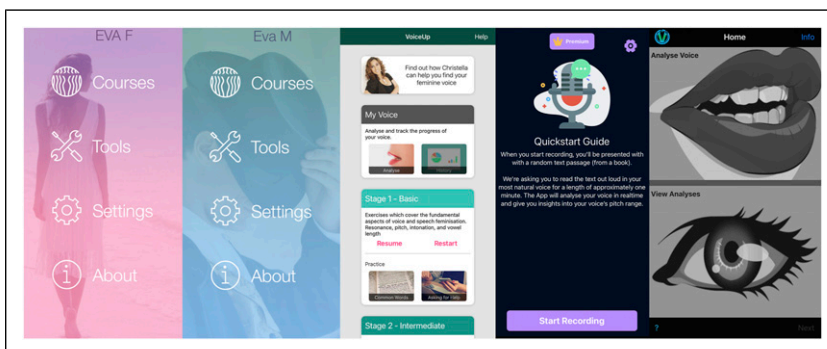


Figure 1. App home screens, from left to right: EvaF, EvaM, VoiceUp, Voice Pitch Analyzer and OperaVox Lite.

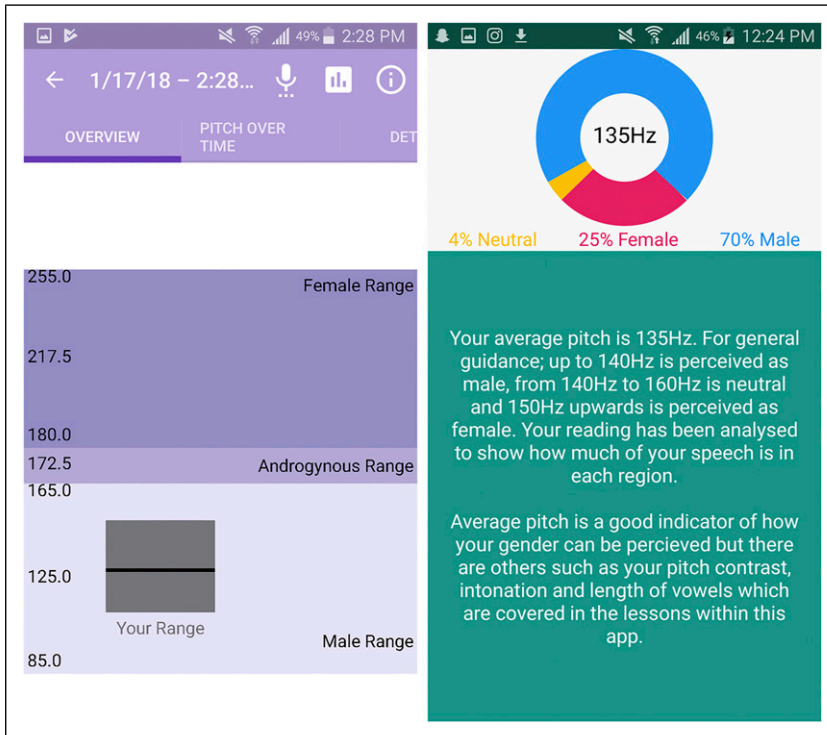


Figure 2. Left: Voice Pitch Analyzer screen depicting the results of a voice assessment (Purr Programming, 2017). The vertical axis depicts pitch in Hertz, and a shaded gray box represents the user's pitch range, with a solid black line denoting the average. Right: VoiceUp screen showing the results of a pitch analysis as a donut chart according to gender (SpeechTools Ltd, 2021).

explicit references to gender beyond the images, and results are simply presented as numerical frequency (Hz) values over time.

The apps' descriptions and introductory materials also instruct users on how to imagine each app and its (actual or possible) conditions of use. Both Eva apps emphasize ideals of mobility and convenience, noting that users can do their exercises in various locations or in transit; however, they differ in terms of how these ideals are described. EvaM, for example, describes itself as a fitness-like 'personal voice trainer' that you can take with you 'wherever you go'. EvaF, on the other hand, deploys more active, jet-set imagery in noting that one can use the app 'while at home or on the go, in your hotel room, office, or airport or wherever you may be in the world!' Other apps are less aspirational and more utilitarian. VoiceUp regularly emphasizes the need to minimize ambient noise while practicing, noting that 'a quiet space is required' for 'accurate results'. Similarly, OperaVOX instructs users to 'make sure you are in a quiet room where there is no one talking around you'. Though less vivid than the Eva apps, reminders to move into an enclosed space with minimal noise nonetheless presume access to a certain degree of privacy.

For the Eva and VoiceUp apps, conditions of use also evoked ideals of time and physical ability. Temporally speaking, all of the apps note the necessity of regular use and tracking progress over time – that is, they imagine a continued course of regular or semi-regular engagement moving toward an idealized or desired goal. The Eva and VoiceUp apps describe voice training as one of

linear progress toward desired results. They emphasize that regular and long-term use is required for users to fully benefit from these apps. The EvaM app notes that although ‘you can work with EvaM as often as you need’ the best results are achieved when ‘you do a little something every day, instead of a large self-guided practice session once a week, for example’. VoiceUp encourages focused study over the course of ‘4 weeks of use’. In terms of ability, the Eva and VoiceUp apps conceptualize use as a whole-body experience that presumes a particular kind of able-bodied person adept at using mobile computing devices. Vocal mechanics are described as an assemblage of biological, physical and mental processes without noting differences or acknowledging potential complications from disability (for example, when describing ‘proper’ or ‘correct’ posture for voice exercises). Consequently, these apps appear to conceive of transgender persons’ ‘true selves’ as realizable only under certain conditions of affluence, availability and physical ability.

Once familiarized with an app, users can initiate voice training exercises. At various points, users are directed to speak, breathe, sing or make other audible sounds into a device’s microphone. These sounds are captured, recorded and processed in different ways depending on the exercise. Processed results are then converted into visual or text-based feedback and displayed to users almost immediately. These dynamic processes distinguish mobile voice training apps from other options available to trans people online, like voice training YouTube tutorials or web pages that unidirectionally impart information.¹² They also give users an experience of ‘real time’ and ‘objective’ judgment and evaluation, as results are presented in technical terms using numerical measures like hertz (Hz) and plotted on charts and graphs that specify ‘ideal’ results or ranges for feminine or masculine voices (see [Figure 2](#)).

The apps all varied in their style, progression and level of instruction. More sparse apps like Voice Pitch Analyzer and OperaVox Lite did not contain guided training materials, only prompts to record and analyze one’s voice. Eva and VoiceUp, on the other hand, offer more systematic ‘courses’ of study featuring introductory text screens, lecture-style videos, and interactive exercises. For example, EvaF begins with a course on ‘Voice Feminization Fundamentals’ containing ‘exercises, techniques and strategies for building a strong foundation for your feminine voice’. EvaM has a corresponding course titled ‘Trans Masculine Voice Training’ (not, curiously, ‘Voice Masculinization’). EvaF’s introduction to the course begins with a video featuring bright musical tones and Perez narrating over words and images on a pink-to-purple background. Here, Perez introduces ‘the nine elements of an exceptional voice’ (‘pitch, voice quality, loudness, resonance, articulation, phrasing, pacing, melodic intonation, and fluency’), grounding voice fundamentals in her brand (Exceptional Voice, Inc). In VoiceUp, users begin by performing a brief baseline voice assessment that includes a questionnaire where users are asked to rate (on a five point scale) their agreement with a series of statements relative to their voice (for example, ‘I feel comfortable when talking to friends and family’). After the initial assessment, users proceed to the free ‘Stage 1 - Basic’ introductory course where Antoni welcomes users and leads them through a series of exercises that feature an explanation (e.g., ‘Exercise 1: Forward Focus Face Resonance’ is designed ‘to lift the pitch and resonance forward so that it is placed into the face’) followed by a repeat-after-me activity, during which the user is invited to copy Antoni after she speaks.

Finally, users who decide to stop using the apps for any reason can exit the app or delete it entirely. In terms of exit or temporary disconnection, some apps offered explicit stopping points to take breaks and prevent vocal strain. For more permanent disconnection, none of the apps featured options or information on deletion or permanent removal. As none of the apps require users to set up an account, there are none to delete. VoiceUp, OperaVOX Lite and Voice Pitch Analyzer both automatically saved voice assessment data to users’ devices, allowing users to track the results of their voice exercises over time. However, there is no option within the apps to clear that saved data.

Eva appears to save only minimal user data, namely which lessons the user has purchased. In the app's settings, users can tap 'Restore Purchases', which presumably checks an external server to determine if the user had bought a course on a different device (likely via one's Apple or Android app store record). In some ways, these features – no account creation, local storage, and minimal data collection – can be construed as attentive to potential privacy and safety concerns transgender or other users might have. However, it may also be the case that these benefits are merely secondary to a business model of one-time sale as opposed to continual capturing and monetizing of user data.

Authority, transnormativity, and finding your true voice

Some initial themes are evident in the app overviews provided above. The home screens for apps like Eva and VoiceUp, for example, hardly need further explication; their visual imagery obviously projects a normative ideal of gender as embodied in Western and white subjects dressed in conventionally 'feminine' or 'masculine' ways. The images also exhibit a particular middle- to upper-middle class status, as evidenced by consumptive 'work and leisure' activities like EvaF's beach vacation scene, EvaM's shirt-and-tie look and VoiceUp's smartly dressed stand-ins sharing cocktails at a trendy bar. Given the ways these images frame all engagements with the apps, the 'ideal' gendered voice is continuous with the needs and interests of white, middle-class subjects within a Western, consumer-oriented socioeconomic context. Further, it is clear that for apps like Eva and VoiceUp, the vision and 'brand' of the speech therapists behind the apps is not only prominent in their introductory materials, but heavily informs their overall structure and design. Users are instructed to model their speech on the vocal patterns and tendencies embodied by the creators – a bare mimicry that is obscured by appeals to binary gendered anatomical and physiological distinctions that give each approach a systematic and 'scientific' feel. The heavy imprint of speech pathology on these apps echoes [Zimman's \(2016\)](#) insights into the broader ways research and practice reproduce a flat gender binary typified by white and middle-class men and women.

Encoding gender and race beyond images.

The racialized and classed gender ideals encoded in apps like Eva and VoiceUp are more pernicious than a surface read of each apps' use of images. For example, Antoni sometimes describes gendered voices as inhering in 'tendencies' rather than in innate bodily differences (e.g., 'females tend to vary the intonation of their voices more than men', 'females typically tend to lengthen their vowels slightly'), which on the surface appear to move us away from more deterministic physiological accounts of gender and voice. However, her prim instructions and constant use of binary oppositions in her explanations continually reinforce categorical gender divisions while her basic repeat-after-me activities make 'appropriate' vocal expression synonymous with her language and style (e.g., the language and style of a white middle-aged English woman). In this way, a kind of socially based gender essentialism does the work otherwise done by physiologically based determinism by presenting parochial expressions of gender as universal standards.

This sort of essentialist account also appears throughout discussions and illustrations in the Eva app. In EvaF, Perez often uses the language of 'we' to implicitly draw the user and Perez together as women generally, despite Perez's manner and expression being representative of only some kinds of women (i.e., women like her). In EvaM, Perez discusses her motivation for creating a voice masculinization service by sharing a story about a trans man she once met, who helped her realize that trans men 'don't want to give up the compassion, empathy or gentleness [they] value' but 'want a rich masculine tone of voice to convey [their] thoughts and feelings', not a 'tight, thin, strained voice'. Here, an idealized sensitive and 'enlightened' masculinity is represented by a voice

described as ‘rich’ and contrasted with ‘tight’ and ‘thin’ feminized voices, reinforcing a binary distinction not only by reference to mere vocal mechanics but also by their social interpretations.

In the Eva apps, these standards are bolstered by the use of particular analogies. In her definition of ‘Melodic Intonation’, for example, Perez informs users that ‘women tend to speak in quite a variable pitch range because we often use falsetto. We can go from as low as F below middle C, to as high as C above middle C... Men tend to inflect and communicate in a limited pitch range’. Later, Perez defines ‘fluency’ as ‘extremely key’, saying: ‘think of classical music, it’s flowing, legato, smooth, and blending, then think of some modern rock and roll music or rap music and it has a very staccato beat to it. Men tend to speak in a more staccato manner, women tend to speak in a more flowing manner’. The analogy is then illustrated by two measures of music, with a four-note legato phrase to illustrate femininity and a disjointed series of disconnected notes to illustrate masculinity. Users are told to ‘think of’ staccato voicing as not only a feature of masculine voices but also rock and rap music; at the same time, users are asked to ‘think of’ legato voicing as not only a feature of feminine voices but also of classical music (despite staccato and legato being features of any genre of music). More than mere offhand illustration, this use of analogy invites users to identify with some expressions as good or appropriate and others as bad or inappropriate. Here, identification is evoked when users are subtly encouraged to identify their femininity with legato phrasing in classical music – a genre often coded white, European and refined or upper-class – and to distance themselves from the staccato phrasing associated with rock or rap (genres often coded white and Black respectively, as well as masculine, aggressive or even ‘rough’ or poor).

Moreover, only voices that conform to these racialized and gendered ideals are repeatedly referred to within the apps as users ‘real’ or authentic voices. Despite a few more ‘inclusive’ gestures, the Eva and VoiceUp apps clearly exclude those whose gender is non-binary, non-conforming or otherwise not captured within this normative binary frame. For example, EvaM at one point adds an asterisk after the word trans (trans*), opening up the possibility that users of EvaM might hold a wider range of gender identities than just ‘trans man’. However, this asterisk is the only reference to a broader conception of ‘transgender’ than trans woman and trans man in the Eva suite of apps (EvaF contains no such references and presumes all users seeking to feminize their voice identify as trans women). These moves reinforce the apps’ framing of ‘authentic’ gendered voices as those voices that are indistinguishable from a normative (white, middle-class, cisgender) ideal.

Fidelity to normative authority as the path to authenticity.

The above associations, identifications and normative ideals encoded in the apps are important for making sense of different apps’ frequent appeals to concepts of ‘true’ or ‘authentic’ selves and selfhood. As Stephanie [Duguay \(2017\)](#) – drawing on Anthony [Giddens’ \(1991\)](#) discussions of authenticity’s discursive and behavioral dimensions – has noted elsewhere, mobile apps shape users’ claims to ‘authentic’ or ‘real’ selves in various ways, from the administrative (as with mechanisms for identity or location verification) to the expressive (as with user bios or ‘About Me’ prompts). Although these voice training applications lack many of the social and technical features that shape ‘authentic’ selves on other applications and platforms (e.g., [Haimson and Hoffmann, 2016](#)), authenticity and users’ ‘true’ or ‘real’ selves is nonetheless central to how these apps frame the purpose and goals of voice training for transgender people.

For both apps, the authority of the speech therapist is integral to a user finding their ‘real’ or authentic gendered voice. Both Perez and Antoni describe their approaches as novel or even ‘acclaimed’ models for voice training and they establish their credentials by reference to professional qualifications and experience. More than simply citing credentials, however, both women deploy notions of empathy and care to position themselves as ambassadors to not only voice

training, but to a kind of gendered journey or enlightenment. More than simply training your voice, they will help users find their ‘true’, ‘accurate’ or real ‘selves’. The Eva apps weave together these ideals of authentic expression and the therapist’s authority throughout. The About page, for example, describes Perez as ‘dedicated to helping transgender individuals find their true voices’, while a subsequent course page declares that ‘the grand vision for your feminine voice is to give you the ultimate confidence in expressing your True Self’. This therapist branding of the Eva and VoiceUp apps also marks a sharp break with apps like Voice Pitch Analyzer and OperaVOX Lite which simply direct users to record themselves speaking so the app can capture and compare it against preset normative pitch ranges.

The idea of authority is also expressed through the apps’ visualizations and communication of results, leveraging their capacity for user interaction and dynamic feedback. Whether plotted on a graph or visualized in real-time, each app interprets and visualizes results according to certain quantitative and technical measures, such as Hertz values or percentages of time spent speaking in a certain pitch range. Coupled with technical descriptions of vocal mechanics and anatomy, the use of these values and visualizations lends the apps a kind of scientific authority: regardless of any appeals to subjective feelings or experiences tied to a user’s gender, voices have objective qualities that can be measured, recorded and tracked over time. Unsurprisingly, the design and delivery of these feedback mechanisms revolves heavily around categorical conceptions of gender expression. After prompting users to read aloud, Voice Pitch Analyzer sorts results into ‘Male Range (85–180 Hz)’, ‘Androgynous’, and ‘Female Range (165–255 Hz)’. VoiceUp’s reading exercise results takes a slightly different approach, showing users the percentage of time their voice was above or below a certain gendered pitch threshold via a donut chart (a pie chart with an inner circle cut out) with colored portions designating ‘Feminine’ (pink), ‘Gender Neutral’ (yellow), and ‘Masculine’ (blue) speaking ranges (see [Figure 2](#), right). Eva’s feedback emphasizes success or failure in hitting target values rather than articulating results as spanning different ranges. Feedback using the app’s Pitch Tuner, for example, is organized around three concentric circles, with the outer ring labeled ‘110 Hz’, the middle ‘220 Hz’, and the inner ‘440 Hz’. As the user speaks, an additional concentric circle appears and expands or contracts depending on the pitch of the user’s voice, changing color relative to some target value. For the voice feminizing EvaF app, it appears red when a user’s voice is below or above a ‘feminine’ target of 220 Hz and green when it is ‘on target’ (see [Figure 3](#)).

The authoritativeness of technical measures like Hz is reinforced in apps’ interpretations of results. While discussing pitch results, EvaF explains that the ‘average adult female has a pitch somewhere about 200 to about 300 Hz’, and that the ‘average adult male has a pitch from about 100 to 150 Hz’. For resonance, Perez points out that a tenor and alto singer can produce the exact same pitch with their voices, but then asks: ‘We have to say to ourselves, what is it about those two voices that lets us know that one is a male voice and that one is a female voice?... The shape of his throat, the size of his throat will create deeper resonant overtones, and let us know that it’s a male voice producing that pitch’. This statement is accompanied by an image featuring two abstract human profiles, one in blue and one in red, with the vocal cavity outlined in each (see [Figure 4](#)). The user can then notice the anatomical qualities of different voices, the implication being that the larger size cavity on the blue profile equals a ‘male voice’ while the narrower cavity on the pink profile equals a ‘female voice’. Here, social and physiological dimensions of voice converge to bolster the legitimacy of the offered technical measures as issuing from a combination of throat size and resonance that ‘lets us know’ a voice’s ‘true’ gender.



Figure 3. EvaF screen showing real-time feedback on the user's voice as being below the 'feminine' target (left); and on target (right) (VoxPop, 2021a).

Voice training and the transnormative subject.

Far from innocuous, the language of 'real' and 'authentic' set alongside discreet gender categories and quasi-scientific measurement evokes a longer history of norm enforcement and oppressive gatekeeping in transgender healthcare. A trans person's access to hormones, surgeries or other care was often (and in many places remains) predicated on being perceived as *truly* or *really* identifying with the 'opposite' gender, and on being heterosexual after transition (Vipond, 2015: 25–26). This successful demonstration, however, was usually (and often remains) contingent on performing a normative, binary gendered ideal as judged by a cisgender doctor or other clinical professional (Johnson, 2016). Here, one's gendered self is only 'true' insofar as it hews to a particular (binary, raced and classed) gender norm. Rather than being in tension with the more subjective notion of an individual 'gender journey', however, these two conceptions of real or authentic selves reflect a broader genre of wellness capitalism, where products and lifestyles are sold as ways to realize an individual and unique self through consumption and conformity.

Through measurement, data tracking, and rhetorical appeals to one's gender 'journey', these apps reproduce what Aren Aizura (2012: 142) has identified as the 'dominant spatial narrative' of gender transition: the 'journey out and return home'. In this narrative, trans people are deemed legible and tolerable on the condition that they depart from society at one end of a binary gender pole and return at the other, 'conceal[ing] the possibility that gender is not binary and present[ing] transexuality as a one-way trip from man to woman or woman to man' (Aizura, 2012: 145–146). For Aizura, the space between the journey out and return home is 'the elsewhere': a place where uncertainty about an individual's gender expression is hidden from view (e.g., through travel and workplace medical leaves), and where the 'gendered indeterminacy that haunts gender everywhere' is neatly confined 'to a spatially contained location' (Aizura, 2012: 145–146).

As technologies of transition, mobile voice training apps reproduce the idea of transition as occurring 'elsewhere'. Eva and VoiceUp lean heavily on the idea that trans people are engaged in a

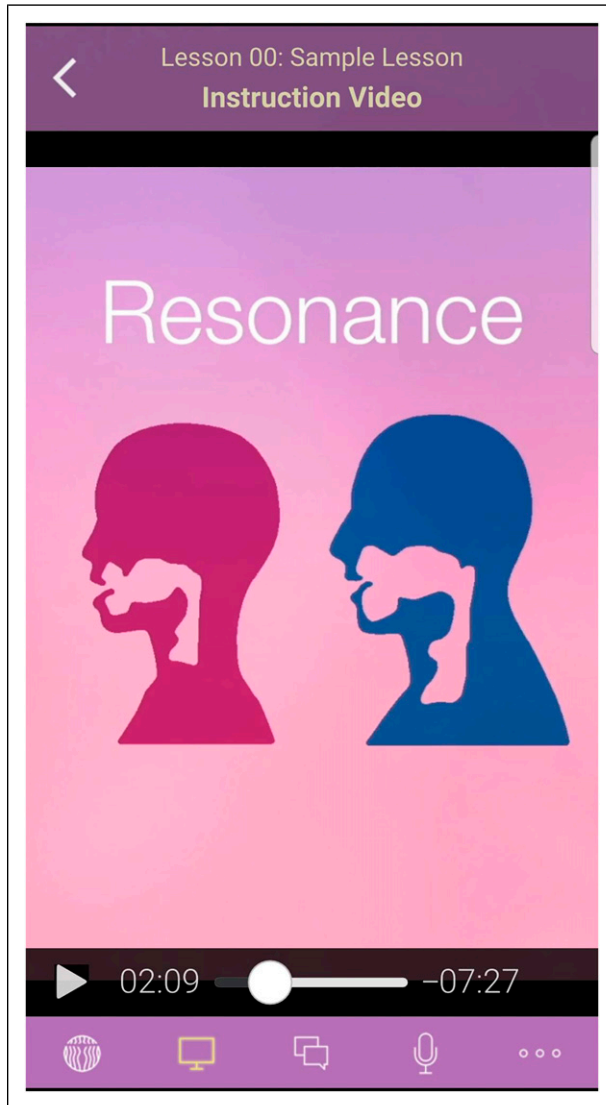


Figure 4. EvaF screen showing differences in ‘male’ (blue) and ‘female’ (female) vocal cavities (VoxPop, 2021a).

kind of individual and subjective gender journey. EvaF lays out three courses that build on each other, starting with Voice Feminization Fundamentals, followed by Beyond the Fundamentals, and culminating with Mastery of Your Feminine Voice. This sequence is presented as a journey that starts from a ‘strong foundation’ that enables the user to ‘go deeper’ into ‘the naturalizing elements’, which finally lets the user realize ‘the grand vision for your feminine voice to give you the ultimate confidence in expressing your True Self’ (see Figure 5). More recently, Perez has expanded her services to an online community available for an annual subscription fee of \$108 USD, unlocking additional training content and regular video calls with creator Perez and other users, opening up a

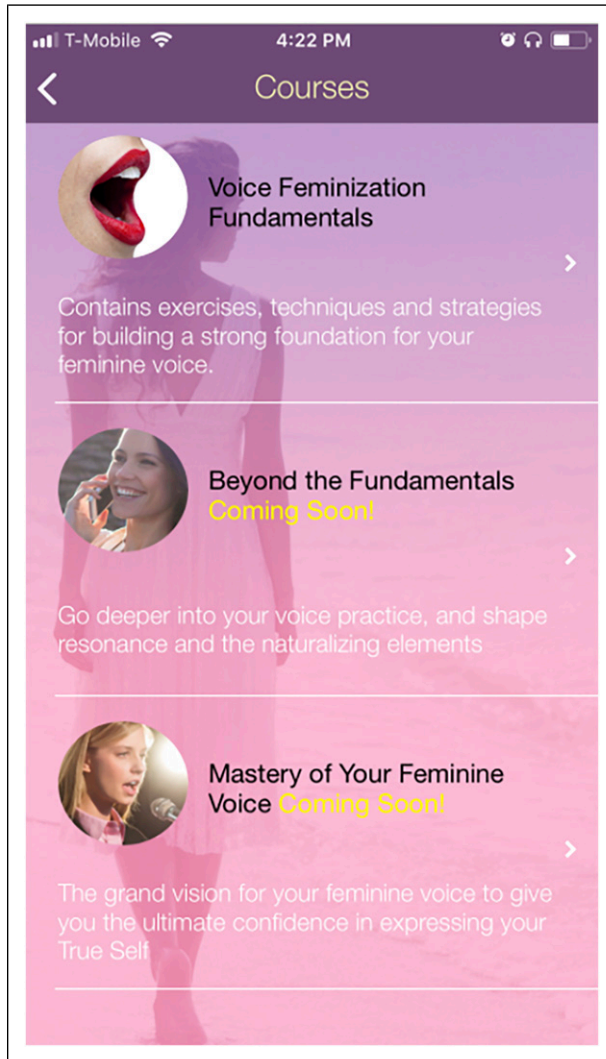


Figure 5. Screenshot from EvaF detailing course offerings (VoxPop, 2021a).

new revenue stream as well as direct (online) connections that transcend the app's one-way interactions. The service encourages visitors to subscribe with the words: 'Be clear about your goal and your path and you will find success. Invest in yourself. You'll be happy that you did!' This statement underscores one of the major selling points of commercial voice training services: to find success and happiness through clarifying the 'goal' and 'path' of (vocal) gender transition.

In VoiceUp, the idea of the journey is evident in the butterfly-like progression of VoiceUp's curriculum. The app's beginner stage focuses on 'Common Words' and 'Asking for Help' with stock photos of a dictionary page and hands using a mobile device – the hands have white skin, red manicured nails and are adorned with jewelry. The intermediate stage focuses on 'Appointments' and 'Office & Work' with stock photos of a day planner and a generic white collar office. In the

advanced stage, the focus turns to ‘Social Life’ and ‘Holidays & Travel’ with stock photos of white hands raising colorful cocktails and a packed suitcase. This progression evokes a butterfly-like journey, with a user retreating delicately and later emerging confidently from their cocoon to take their proper place in a white and middle-class social world of work and leisure. This framing is further emphasized by revisions to the app captured over the course of the project. In particular, the current text noting that Christella Antoni can ‘help you find your feminine voice’ replaced an earlier prompt to ‘Find out how Christella can improve your voice’. Whereas the language of ‘improvement’ suggests a user’s voice is deficient and needs fixing, the language of discovery – ‘find your feminine voice’ – emphasizes ownership and self-actualization.

In terms of data collection and analysis, both VoiceUp and Voice Pitch Analyzer automatically create charts that allow users to view their data over time, and assign gendered (masculine/feminine/androgynous) labels to their average pitch values at each time point. Moreover, Eva and VoiceUp’s pedagogical materials stress that the successful user will interact with the app for a sustained amount of time, and that this process/journey involves both the concrete acquisition of skills and a more subjective ‘finding’ one’s ‘true’ or ‘authentic’ voice. In addition, EvaF’s automatically renewing subscription service implies an ongoing process of learning and refinement toward a discrete goal. Notably, the apps never connect to other apps on the device, for example, by allowing users to login using their Facebook credentials, or to instantly share data via social media or email (a common feature in modern apps). Insofar as data is ever shared, it is shared voluntarily by users in online, often anonymous communities where trans people discuss their transitions. Apps are presented and sold as places where users can exhibit and correct vocal gender variance or uncertainty, separately from their public online persona. But more importantly, they are places where uncertainty supposedly gives way to certainty along a path of self-actualization, with the help of technology.

Conclusion

The proliferation of digital technologies and services for transgender people is often taken as a positive development. Less often discussed, however, are the ideals to which trans users must conform in order to use them. Although voice training apps are accessed without the involvement of a medical institution, users are likely to encounter digital representations of individuals and ideologies that are deeply rooted in a particular medicalized narrative of trans existence. As we have shown, trans voice training apps encode their normative commitments through a combination of data collection and visualization, visual representation of human bodies, and pedagogical material delivered through text, images and video. Through these elements, apps like Eva and VoiceUp position voice training as part of the ‘elsewhere’ of transition, described by [Aizura \(2012\)](#) as a physical sojourn from a trans person’s social environment where gender deviance is contained, classified and corrected. The apps we examined all frame trans voice training as a transformative journey to one’s authentic self, enabled by careful study and data tracking to optimize one’s voice according to metrics like pitch, resonance, softness and loudness. Future research might connect the findings presented here with critical research on the digital health industry (e.g., [Ruckenstein and Shüll, 2017](#)), and on relentless technology development as the purported solution to social ills (e.g., [Greene, 2021](#)).

In their current iterations, the examined mobile voice training apps present gender transition as having a preordained teleology: a notion of progress with a fixed destination. As elaborated by [Aizura \(2012\)](#), such notions are tied up in the American context and its ‘mythology of liberal individualism, that everyone can and should transform themselves and acquire social mobility’. [Jasbir Puar \(2017: 46\)](#) observes that the ‘suturing of trans to exceptional futurity and the potential

that the future offers is the new transnormative body'. In other words, transnormativity is not about individual trans people embodying socially expected or acceptable forms of gender expression (and using various technologies to achieve that). And it is not *just* a term for the systemic force that disciplines trans people toward those acceptable forms, penalizing those who fail to do so. Recalling Aizura's 'elsewhere', capitalism demands the partition of our bodies into the 'good' and 'bad' such that the bad can be sequestered, transformed and improved upon. The tantalizing conclusion of this process is an "exceptional" subject – with an exceptional voice.

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Notes

1. For more comprehensive collections of work in, variously, digital and media studies, social computing, and the cultural study of technology relevant to trans experiences and subjectivities, see: [Billard \(2021\)](#) and [Haimson \(2021\)](#).
2. Though Lola's own gender identity is never specified, the character has been variously described as – and is widely accepted to be – a transsexual or transgender woman.
3. As with other technologies of transition, however, vocal therapies and surgeries occupy an ambivalent place among trans people generally. Some people may experience their voice as distressing or dysphoria-inducing while others may not; trans women, for example, have been found to vary widely in whether they identify with 'ideal' feminine voices, adopt them conditionally, or reject them entirely (see: [Ahmed, 2018](#)). Further, a trans person's vulnerability to violence and discrimination is also informed by other aspects of one's social position – especially race, citizenship status and socioeconomic standing; the threat of being 'clocked' by one's voice will be experienced differently by differently situated people. Accordingly, this section should be read as sketching some relevant themes connecting ideas of voice to ideas of gender and not as trying to capture any general experience of 'voice' and vulnerability applicable to all trans people.
4. Since 2012, the *Finding Your Female Voice* video series has been available on YouTube ([Deep Stealth Productions, 2012](#)).
5. At the time of writing, each app was available in both the iOS and Android app stores. Original data collection took place in 2018 and preliminary work was carried out during 2019, though plans for submission in early 2020 were interrupted by the COVID-19 pandemic. After regrouping in fall 2020, we re-reviewed the apps and their changelogs to identify any major updates or other changes. Our review confirmed that 1) each app was still available for download at the time of writing and 2) there were no major updates since the time of original data collection, only some minor esthetic and pricing tweaks (which we have accounted for in our analysis).
6. Rather than being in competition with the walkthrough method, these two approaches should be viewed as complementary – indeed, the walkthrough method was designed to be compatible with a range of critical, cultural, and social scientific analyses ([Light, et al., 2018](#): 888).
8. It is worth noting that the present study reserves judgment on whether and how trans people use these apps, whether out of curiosity, irony or a sincere desire for support and validation; nor is our intention merely to criticize and advocate for changes within individual apps. Rather, as a discursive analysis our aim is to

make sense of mobile voice training applications as digital technologies that encode and reproduce particular ideals of gender expression and transition. Accordingly, our claims are restricted to semiotic elements, technical affordances, and contextual features of the apps themselves. For qualitative, interview-based work with trans people on the subject of voice training and technology, see: Ahmed (2018).

9. For example, some of the available apps were older versions of apps included in our study. Because these apps are no longer updated or supported and new users are encouraged to use the more recent versions, we set aside these older apps.
10. Though available at the time of data collection, OperaVox Lite has since disappeared from both app stores. While we retain it in our analysis for comparative purposes, we place greater analytic emphasis on those apps that are still currently available.
11. Hertz (abbreviated 'Hz') indicates the frequency of a sound wave, which is perceived as pitch.
12. At the same time, Eva and VoiceUp are clear to state that the apps are not a substitute for in-person voice therapy, positioning the apps as a 'next best' alternative. Eva's Kathe Perez also uses this disclaimer to advertise her (more expensive) real-time therapy services.

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