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Unit 9 Dissertation

EXT: out

The challenges of voice therapy training as it relates to gender dysphoria.

BA Product Design (DPS)

Central Saint Martins, UAL

28/11/2019

Electroglottograph waveform readout. [Wikipedia User Polishwonder74 (2009) *EGG Signal.* Available at: https://en.wikipedia.org/wiki/File:EGG_Signal.jpg (Accessed: 27/11/2019)]

Hypothesis

Voice therapy training is a sensitive and highly personal process which poses significant practical difficulty and emotional strain for trans people with vocal dysphoria. Resources are scarce and sparse; embarrassment pervades around stigma about adults performing vocal training.

Democratised design can facilitate this process by creating assistive tools and means to alleviate the emotional difficulties incurred.

This dissertation concerns voice therapy training, specifically as it relates to the experiences of transgender people, following from the above hypothesis. This enquiry begins at my own experiences as a trans woman and explored the topic through a diverse range of enquiries centred around two themes identified:

1) The practical difficulties in navigating the topic of voice, understanding what resources are available and what to trust, and performing the process of the training itself.
2) The interplay of this process on an individual's mental wellbeing at various stages, and the effect of dysphoria.

The voice is a crucial communication tool which accounts for an enormous share of how we interact with the world on a day-to-day basis. Voices carry a distinctive audio signature from which we interpret information and make judgments on a conscious and sub-conscious level, factoring into how we perceive, recognise and interact with others. Voices are also highly malleable and can be deliberately modified for shorter bursts and for longer-term daily use.

Diagram of vocal communication components, author's own design.

> ❝
>
> It's embarrassing, you know, being
>
> an adult and having to learn to
>
> swallow and talk as if you're a little
>
> baby again

Introduction and Overview of Issue

Voice therapy training involves the process of modifying one's voice to produce a different sound or fix an impediment. Professional voice therapy training (VTT) involves working with a trainer to assess the position of the voice and define end goals, and then to work through a customised training regimen to utilise a range of techniques to achieve these goals. Surgical interventions exist to produce this, but these are risky, very expensive, and usually only advised when other options are not available.

This process has great overlap with the type of training an actor might undertake with many actors and signers participating in VTT themselves. For my purposes I am focused on how VTT is used by trans people, such as myself, to bring the voice in line with our personal authentic presentation of ourselves and to alleviate gender dysphoria.

During my primary research I encountered, by coincidence rather than deliberate search, a surprising number of people how had partaken in VTT for reasons other than being trans. One woman had a naturally deep voice as a child along with speech impediments and had to have vocal training on both accounts. Another described a condition resulting in them having a short tongue, this affected speech but also swallowing and other functions of the mouth. For the purpose of discretion names and identifying details are withheld for these people. This person described a VTT process which involved learning to swallow and speak effectively, highlighting less the physical difficulties and more on the emotional aspect.

I additionally talked to older people attending the voice clinic I attend who gave some insight (albeit from a layman, non-medical professional point of view) into how the effect of age can alter the voice, pose new

difficulties for people undergoing VTT and intersect in problematic ways with respiratory conditions and speech impediments.

These examples are noted to highlight some of the practical boundaries inherent in this project topic. Voice therapy training will be different for each person who peruses it, perhaps one person wished to add more chest resonance while another is concerned only by pitch, to give two common examples.

If we look at the needs of the trans population specifically, we find a diverse set of requirements before any possible intersection of additional complications like an impediment. For this reason, I identified a set of user groups around which to structure my research. The project will take, as its core demographic, trans feminine people between the ages of 16 and 60, primarily English speakers [1]. The project should also try to encompass people who desire to masculinise their voice or find an androgynous range, however if the requirements of these groups is too distinct from the feminisation route, time and resource limitations will mean this is not possible. Lastly I define a tertiary group; those requiring voice therapy training for reasons unrelated to trans issues, stating that it would be optimal if such an outcome could also benefit such people but the project will not take them as a target user group, again for the reason of limitations of scope.

While masculinising hormones lower the voice, this can often lead to undesired effects 'not going far enough'; some trans men have often described sounding akin to a teenage boy, referencing the fact that testosterone has 'cracked' their voice part of the way but leaves some effect to be desired. For this reason, some trans masculine people (looking for voice modification) desire no VTT and get all they want from hormones, while others need to facilitate the hormonal effect themselves to 'finish the job'.

Feminising hormones on the other hand do nothing to the voice.

Once the vocal box has dropped, it cannot be "un-dropped" in a physical sense. However, through VTT the voice can be modified to a feminine or androgynous sound to achieve this "un-dropping" in practicality.

These user-cases are generalisations and make assumptions on how a particular group wants their voice to be, as well as some assumptions made about their starting point (e.g. that a trans-woman will definitely have a deep voice to begin with, and desires to achieve what most would consider to be a "typical" female voice). There exists a large group of people, perhaps non-binary or gender non-conforming, who do not fit such neat dichotomies, but said dichotomies are used nevertheless to attempt to define an actionable area for the project.

Because of the non-linear nature of each person's journey, it is difficult to paint a picture of *the* user journey as it currently stands but instead more useful to identify key touch points as follows:

- Precursory internet searches will introduce that "Voice Training" exists and can help with their situation (giving overviews)
- Seeing the progress that others have made can create a great sense of hope and optimism, until the user discovers the difficulty of the process itself, at which point they may feel overwhelmed or filled with dread over how much effort is required
- The user may come across DIY instructions on social media in which it appears the same resources are posted around again and again, one such notable example being a Reddit thread by the user u/TattoedTransgirl. **[2]** This thread is cited with such consistency that it is practically an "official" resource. Should anything happen to it or the subreddit, the effects on the community would be felt widely.
- Enticing are the "bedroom vlog" style videos which proport to offer "The Secret™" of voice, which are ultimately useless for the most part. Such videos are examples of a patient's own judgments of a highly personal treatment path that can't really be generalised. **[3]**
- The user may turn to mobile applications and software to guide them. Pitch analysers are used to gain a sense of the median pitch of a voice but the action of using such is performative.
- The user may access professional voice therapy, which is still significantly the best option *if the user is able to access it to begin with*.
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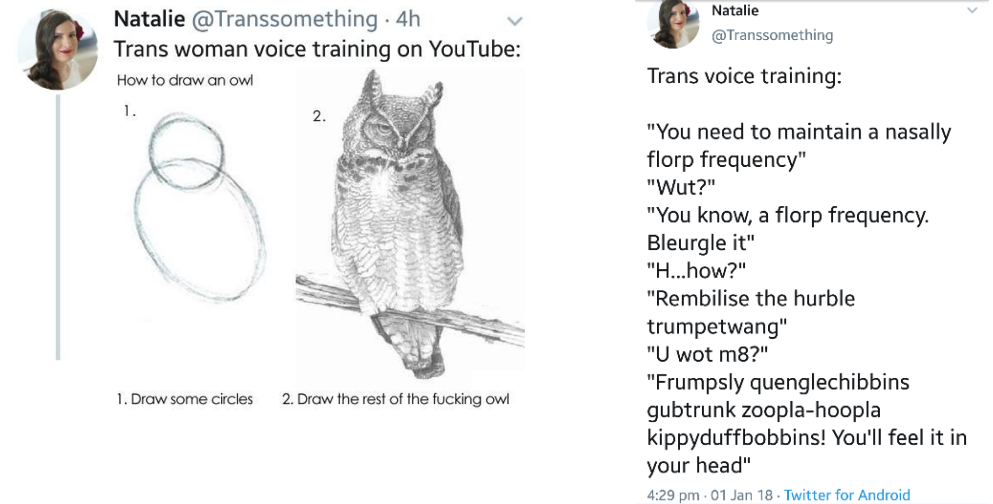
Two tweets from the same person's thread which embody a common frustration from those seeking DIY resources. The last line in the second image is a reference to the common colloquialism "head voice" which aims to make intuitive sense of changes in perceived resonance. **[4]**
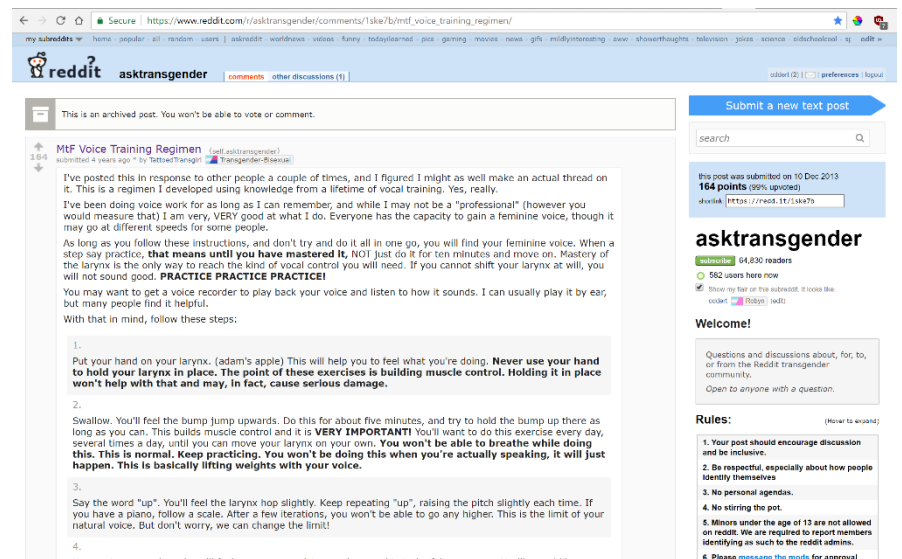
[2]

Professional Voice Therapy Training relies on a trained clinician who works with the patient to identify issues with their voice at current, define actionable goals for how they would like their voice to be, and then work over a long period of time to achieve these goals. The sessions are usually short and intermittent, spread out with month intervals or so. There will be a core process to follow with each week focusing on a different aspect of voice / part of the process but tailored to the individual based on the judgment of the clinician.

There are very few practicing voice therapists who specialise in the topic of transgender voices **[5]**, the ones that do exist tend to be geographically located in particular areas, (in the case of the UK, most operate in London) and the recurring costs can be burdensome for many people. NHS support for trans people is appallingly under performative **[6]**, with waiting lists for Gender Identity Clinics (GIC) -the only section of the service authorised to provide trans care- reaching minimums of 3 years for an initial assessment **[7]**, with some people telling me they were quoted 54 months. The GIC's offer 8 sessions of VTT, which for most people is not nearly enough, and is only a viable option for those already with a GIC, which does not describe most people first starting out who may find themselves the most lost. Waiting for any treatment as a vast detrimental effect, never mind when this directly intersects with minority abuse **[8]**.

The cost of the sessions is one ongoing consideration, but makes no mention of the cost of travel, getting time away from work / school, overnight accommodation etc, and even assumes that there are voice therapists in range of traveling distance to begin with. My voice therapist remarks on how some people travel from all over the country, one person coming from Inverness with 7 hour trips both ways.

This system therefore offers to those who can access it private voice therapists, and to those who cannot, nothing.

It is therefore imperative that as many options as possible be made available to as many people as possible, and that DIY resources are robust and easy to navigate.

We have discussed the inadequacies of some community-made / accumulated resources, but a wider problem encompasses them concerning *resource navigation*. Due the lack of "official" resources, it is common for people to not understand what is actually out there to be utilised, that they must learn the specific inadequacies of the resources from first-hand experience. Navigating parts of the internet such as Reddit, Twitter, Facebook, and YouTube is in itself a detrimental task as such locations are filled with hateful misinformation, propaganda, and people who will actively seek out and target minorities for abuse **[9]**. This severely limits an individual's ability to cope with the task of research itself before even attempting a regimen.

Many people will, during sessions of practice employ the aforementioned pitch analyser apps or other recording software to play back their voice and analyse the results. This can lead to users being swayed or put off by the "number on the app being wrong".

This constitutes a difficulty in 'self-reflection', a phrase here being used not to refer to emotional introspection, but to the literal ability of a user to *perceive* the reality of their voice and monitor progress; to know in the moment that they are slipping into old mistakes, to hear change over time. A component of working with a voice therapist is that, in addition to creating these insights, they can help the user experience a shift in perspective by combining insights from 'external' (the therapist) and 'internal' (patient / user) observations.

Concerning the aforementioned pitch analysers and recoding tools, assuming the physical equipment and software functions to an acceptable level of quality to begin with, there are still issues. The act of sitting in front of one's computer and hitting 'record' is inherently a performative act and creates performative mindsets. Speaking at a little red dot on a screen does not tell you how you sound to people in a crowded coffee shop, at the pub, during a presentation, after running in from unexpected rain with shopping, first thing in the morning, and so one. Each of our voices varies through the day by all the enumerate variables which dictate our physical stature and thus, our voice.

This concept of reflection / visualisation comes into the fore again with the topic of users deciding what they wish to achieve, what is pragmatic to aim for, what timescales to expect, and other tasks relating to the concept of goal setting. As touched upon, creating initial enthusiasm is one thing, but maintaining motivation is much harder. The emotional cost of voice therapy is by far in a way the most difficult aspect of the whole process for many people.

A particular type of frustration spawning from dysphoria follows from not being able to do as well as you'd like, continuing to hear a wrong voice despite great effort. In addition, the inherent timescales, the jealousy of what others have achieved, the lack of ability to know that you are even heading in the correct direction are only the beginning of the quite existential frustration that accompanies vocal dysphoria, something that must be stressed as finding equivalent universal experiences to compare it to accurately can be troublesome, to accurately relate to people who have not experienced this.

Concept of Agency

"[In social science,] Agency is the capacity of individuals to act independently and to make their own free choices. By contrast, structure is those factors of influence (such as social class, religion, gender, ethnicity, ability, customs, etc.) that determine or limit an agent and their decisions." [10]

In this simplest reduction of the difficulties trans people experience in relation to society we can say that there are two components; relation to the self (covering such areas as physical dysphoria, self-image, self-esteem etc.) and relation to wider interactions with society. This is informed by a simplistic 'external-internal' top level view of the topic.

Some problems include societal prejudice and discrimination, on an individual and systemic scale. Other problems include rejection by friends, families, and communities, navigating healthcare barriers and options, dealing with intersections of gendered expectations (toxic masculinity, beauty standards, etc.) [11]. Some physical traits are modified over time with Hormone Replacement Therapy (HRT) with varying results, while others require surgical interventions (of which many exist despite over simplistic societal fixations on genitals).

This dissertation explores the specific problems surrounding voice, and to do so it is useful to employ a concept of agency. Agency, in relation to gender presentation, describes the power to make choices; power to navigate one's own gender and therefore to navigate the variables of how we interact with the world.

In his video essay YouTube: Art of Reality? Thorn, O responds to scepticism over a previous, highly emotional piece where critics claimed that a performance edited and reshot sever times, cannot reflect the seemingly candid emotion displayed. He outlines the difference between imperative truth and other 'types' of truth, how acting is a relationship between performer and audience. We should be careful not to equate gender presentation with acting, but we can see a transferable idea that providing authentic (judge by the individual) gender expression can be viewed as the construction of the true self (that is to say, not fake or new, not a mask) and provide a framework of understanding for its importance, not simply a cosmetic change. **[13] [14]**

We can therefore define three facets of agency as it relates to gender:

1) Agency over self-presentation and ability to express authentically

2) Agency over the self; one's own mental state, over dysphoria

3) Agency in navigating a societies' gender structures

It is worth clarifying that agency does not describe control, because control in this sense is an impractical metric, given that some detrimental aspects of gender in society are not immediately solvable. The classic example of this is that someone authentically navigating a female gender role will encounter inhibiting aspects of patriarchy. This lessens the effective "power" that person has in society, but by being authentic, is an act of exercising agency over gender roles.
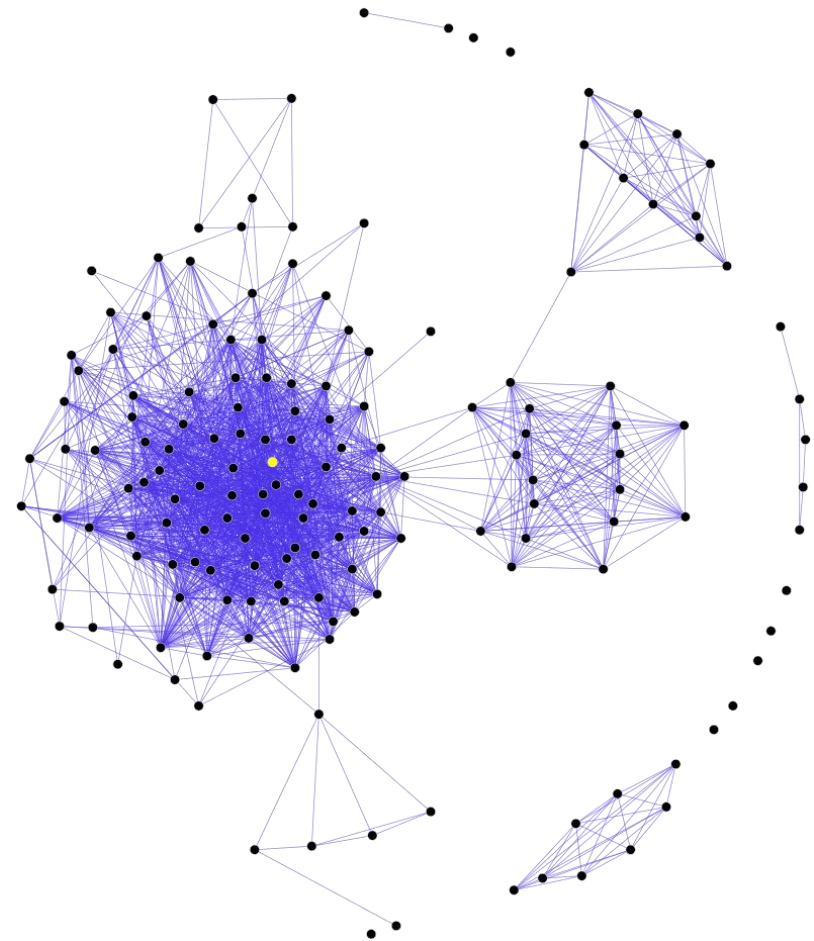
A diagram of a fictional social network. Such diagrams are often used in sociology to visualise interactions as space in which agents navigate. [12]

Voice In relation to Gender and Transition

In her introductory book Gender, Bradley, H takes great influence from Judith Butler [15], but distinguishes her own approach which incorporates a context of global market capitalism, what she refers to as the "frame of shapes and structures of gender" and critiques Butler for missing. Bradley compares and contrasts various models of gender, which I have loosely grouped in the following categories:

- Gender as a Form of Discrimination

- Gender as the Structural basis of inequality

- Gender as a Social category of difference

In the conclusion, Bradley discusses reasons for taking a non-monolithic approach, wanting to avoid and overly simplistic singular conception of gender, and her reason for using Miriam Glucksmann's theory of 'total social organisation of labour' [16]. This, being a '101' text, is of course very high level with regard to gender theory as Bradley weighs just about the entire history of feminism against itself and speculates for the future.

I pooled the categories above as they provide a framework for how these theories of gender relate back to the topic at hand, gender actualisation and transition.

For instance, in the section Gender and Class: Growing up Girl, Growing up Boy Bradley gives examples of how class differences change the dynamic of how gendered expectations exist but I find it more useful, when discussing transgender lives, to turn from a model of "gender and class", to one of "gender *as* class" [17].

Being trans massively reduces employability and violence is prevalent [18], with one third of UK employers being less likely to hire a trans worker [19], in Ireland trans unemployment is at 50% (no records are kept for the UK). [20]. It is also commonly picked up upon that the rate of discrimination is lower the more traditionally 'masculine' or 'feminine' a trans person is. Therefore, it follows that, as with class in general, those who already *have*, have the most capacity to *get*; those who have access to money to buy treatments to aid transition significantly lessen their risk of unemployment and earn more.

This divide is so stark within the community that the experiences of a trans person with money cannot even be compared to a person without. Fay discusses a common example, that of beard shadow. Like with voice, feminising hormones have no effect on facial hair. Treatments are painful, frequently needed and expensive. The trans woman who can afford hair removal will significantly improve her situation with regard to discrimination and also save in the long run; costs of shaving equipment and the laborious task of shaving at least once a day.

"Passing" and "Blending" are two words that try to apply a framework used to describe how effectively one's authentic gender is read in day to day life (or focusing on an individual situation / reaction). These concepts are in many ways quite problematic, becoming prescriptive of masculine and feminine standards when used as a measuring stick for perceived "progress" in transition. This topic alone could be an entire dissertation so I will opt to forego further detail and simply note that when I refer to "passing", I am using it in the most general sense possible, and do not want to apply it in a prescriptive or individual manor.

In the trans community there is a concept of "going stealth", meaning that one reaches a level of 'passing' that they can effectively navigate life without disclosing their trans status, and no one is any the wiser. Many

hold "going stealth" as a goal in itself while others deliberately out themselves as they feel it's more authentic. The choice to do either of these is an example of agency, and once more demonstrates the different experiences of those who have more resources to begin with **[21]**.

The more control over themselves a trans person has, the more agency they can exercise.

Changes in Topic Approach

In essence, consideration of voice modification has been a part of my life in some way for about six years. Around the time of the "springboard" exercise in 2018, I was uncertain if it was even viable as a project direction. A precursory report I wrote at the time (more to sort my own thoughts than anything else) outlined a gatekeeper mentality with regard to VTT.

Looking at the state of trans health care in the UK, which most certainly operates on a gatekeeper model, it is easy to trace where this viewpoint would have originated. I wanted to 'crack the code'; find and build the secret formula of voice, liberating it from those who guard it!

What has changed since then is an appreciation of how diverse the area of VTT is, how many different types of needs there are, how crucial the concept of customised course and tutorship can be, how the basic building blocks are simple. All of which is in addition to the fact that the very few voice therapy trainers that exist are not soulless IP-hoarding corporations, but small-time business owners, all of whom, in my experience at least, got into VTT out of genuine care and a sense of social

justice, their prices existing to pay the bills and keep the lights on (for the most part). While there are a few minor techniques, which belong to an individual's IPR which might be useful to know, they are so far removed from the "secret weapon" conception that I had before that they become irrelevant. Christella Antoni is one of the foremost voice therapists in the UK and is frequently working with other voice and speech therapists, or people looking to move into the field, an encouraging indicator that more will be available in the future.

My interest has shifted to this notion of customisation and ambiguity, and also to the position that constructing a new voice is not even necessarily related to the normalisation process of becoming used to hearing and using it full time. It became more and more evident as time went on, that a one-size-fits-all approach was not really possible.

Or perhaps not even necessary.

Imagine you are intensively training for some upcoming event or frequently take part in intensive sport, you might utilise a range of tools depending on your requirements. A PT is expensive but cuts to the root of what you have to work on and forces you to not stay at home. Small consumer equipment can be used a little every day at home and doesn't require going to the gym while gym equipment is much more professional and can deal with a broader workout. Self Help / DIY videos provide a regimen and motivation over a sustained period of time.

An allegory between PT's and Voice Therapists is obvious -their jobs are even similar in a literal sense- but where is the equivalent of the other precedents discussed and more?

Design Precedents

- **Electroglottographs**

Electroglottographs are systems which use electrostatic probes, attached to a subject's neck to create an EGG waveform. This waveform is interpreted by accompanying software to provide a non-invasive measurement of the vocal folds during speech or signing.

A common EEG is one produced by Glottal Enterprises, another being produced by Laryngograph Ltd. Looking something like a spectrometer or other piece of lab equipment, the Laryngograph is certainly more about pinpoint accuracy than user-friendliness, despite the fact its un-ergonomic nature makes getting an accurate reading difficult on many people. This is striking considering its size, cost and the fact that most of the time, long-term data (without a focus on minute detail) is more useful than the level of detail the system specialises in providing.

The laryngograph is most certainly a research tool first and foremost, nothing about it is accessible or public facing. The fact that it simply does not work on some necks, especially on people with more fat tissue, is perplexing given how useful it is in general day-to-day analysis. This, plus the high cost, makes it untenable to justify purchase for individual use.
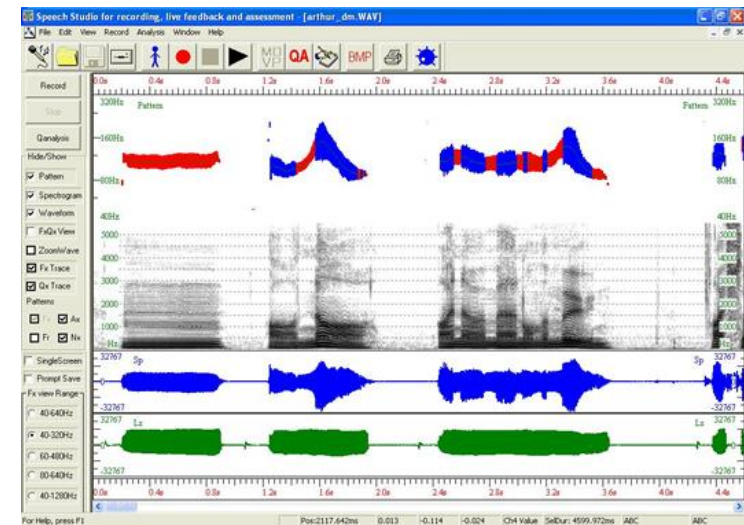
The microProcessor unit by Laryngograph Ltd and accompanying digital analytics software. [22]
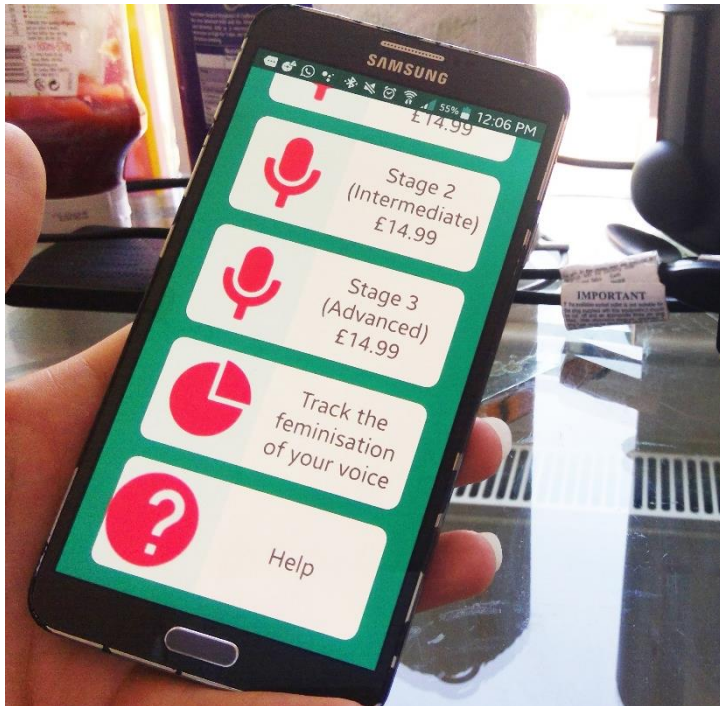
The main screen of Christella Voice Up by Christella Antoni, Available at: https://speechtools.co/christella-voiceup. (Accessed: 28/11/2019) Image is author's own.

- **Christella Voice Up app**

Mobile applications would seem a likely place to look given the issue at hand lends itself to a DIY product outcome, which to many people means "just do an app". Christella Voice Up is an app by Christella Antoni, the voice therapist I attend, and includes a great deal of techniques and resources covered in sessions.

The app is based around three long videos and incorporates a pitch recorder, each video is behind a £15 pay wall despite the app being free to install. The videos are well recorded and paced, what is striking is how much of the content makes no sense without the context of the sessions themselves. How are you to know if a technique is being performed correctly or having the correct effect?

The price involved is a lot of money for essentially YouTube videos and is for many people, unaffordable or at least difficult to justify for many users.

- **Eva MTF/FTM app**

These are two apps by VoxPop LLC who state their aspiration to be "To become the leading and enduring innovator of mobile app voice training products for transgender people in the world.". One app is for vocal feminisation while the other, masculinisation with all documentation referencing trans women and trans men for each respectively.

The apps consist of 20 short video lessons at $5 USD each and incorporate tools such as a metronome, recorder, a resonance analyser, a 'sound pressure and level meter'. It is unknown the effectiveness of each of these **[23]**.

As well as demonstrating the same issues of payment-locked content which prices out many people, the Eva eco system faces two other glaring issues.

The first is that the apps are only available on newer IOS devices with the developer citing "specific hardware limitations" as the reason why. It is unknown why they could not produce a stripped back version to, for example, only include the course content without the analytic suites. It is also striking that only the iPhone 5 and above are supported (iPad Pro is not supported either), yet "1300 Android devices" is the excuse not to release on other platforms.

The apps are drenched in stereotypical imagery, from the glaring pink and blue hue that is on every screen of the respective apps, the images of flowing dresses and lipstick and white text (which is barely legible in some places) the effect is startling just *how* much it all is.
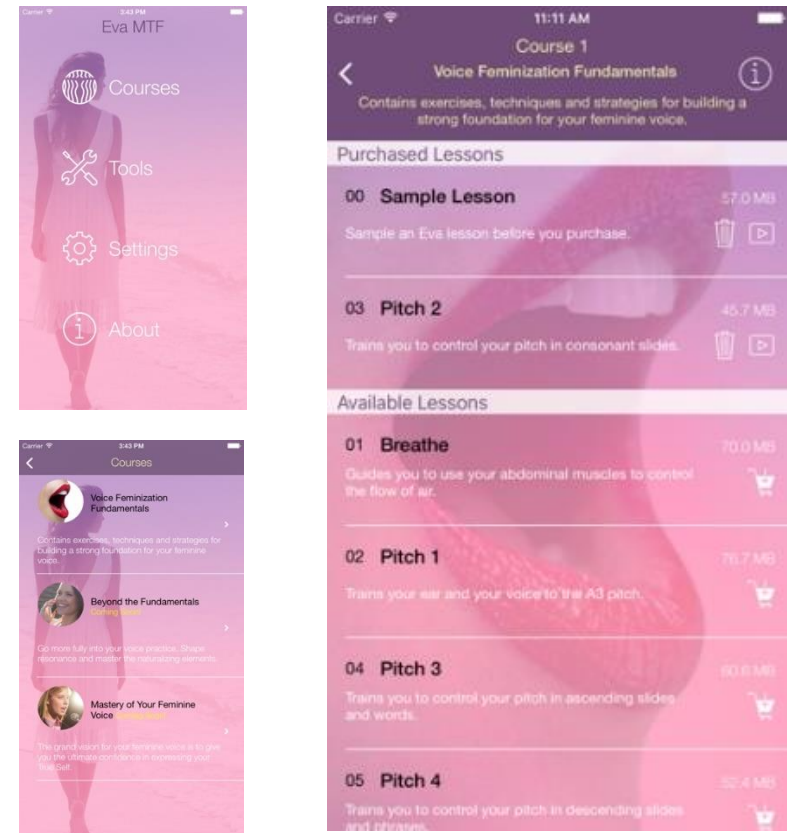
Display images showing screens from Eva MTF, from the Apple App Store. [24]

In the past, many trans people often embraced hyper-feminine and hyper-masculine aesthetic stereotypes as it felt like an assertion of identity attributes previously denied. Older forum sites such as Susan's Palace **[25]** are lasting examples of such. Today there are still some who think along those lines, but there are more still who see this aesthetic as kitsch and patronising. In Eva, it is inescapable.
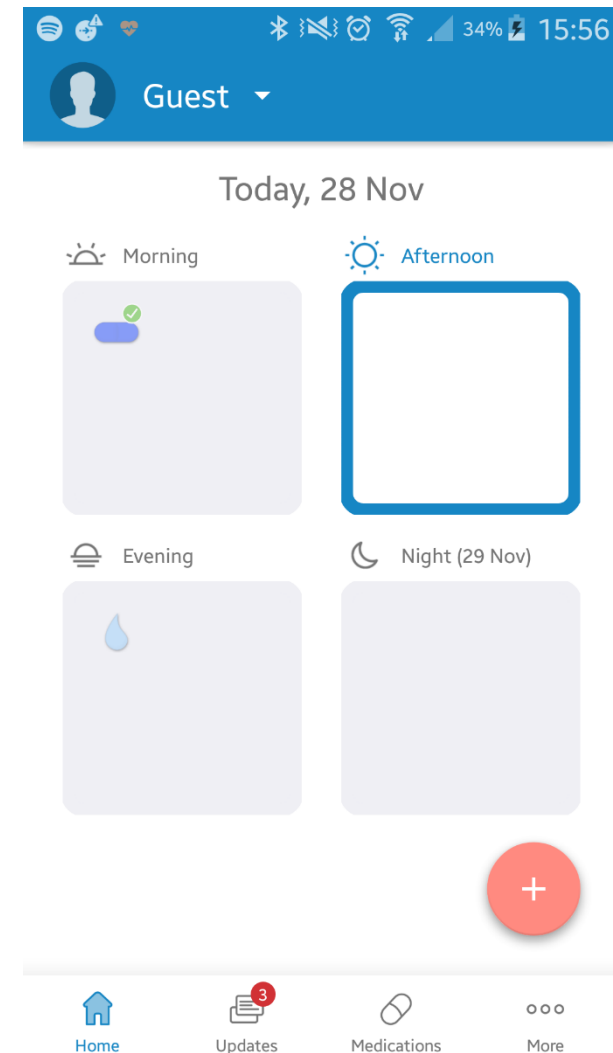
- **Medisafe**

  Medisafe is a medication reminder and tracker, selected specifically to contrast against other apps (in a general sense) which incorporate routine maintenance functions / reminders but do not succeed for one reason or another.
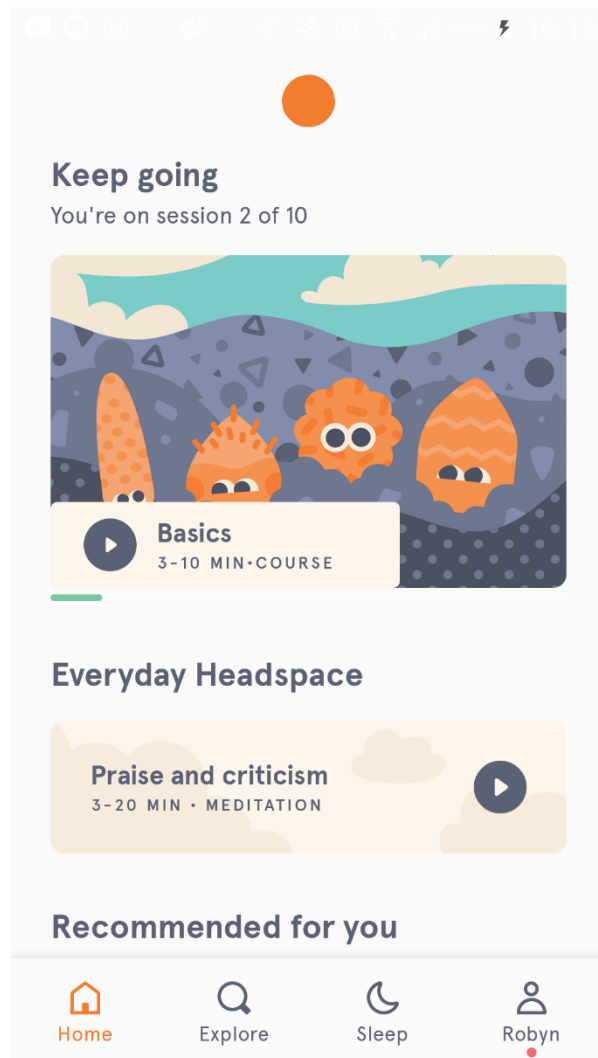
  Medisafe allows you to define medications and set reminder times to take them, you can choose custom icons and colours to associate with each medication. Medisafe uses intrusive notifications and 'device-jacking' to ensure routine maintenance.

  The reason this is so interesting to me is that it flies in the face of modern design thinking in applications, in which there is an ever emerging notion of 'intrusive tech'; the idea that for too long the modality of the technology has been the designer's context and not the user's needs to detrimental effect (i.e. the notion of "just do an app"). By being intrusive and yet consistent, Medisafe forces routine and yet, when it is not actively firing reminders, slinks into the background, to await your action.

  Their open API allows other to extend capabilities, the opposite ethos of the previously discussed closed-systems.

Screenshot of author's own installation and configuration of Medisafe. [26]

- **Headspace**

Headspace was selected as another example of a course-based app with a focus on personal development, in this case meditation and mental health. Headspace is a notable example as it fits more in the prior category of non-intrusive app design, although still focuses the user's habits around the app itself.

Headspace provides very human-sounding encouragement, creating a personal aspect to its use context. Its notifications however are easy to dismiss, appearing in a manor like 'advertisement notifications', they simply encourage you to open the app again and click on the next stage.

Headspace does very well at providing pleasing graphics and comforting voices, all tied together with a distinct visual theme using amusing characters and the motif of an orange orb which is used throughout, for example undulating when a narrator is speaking. It occurs that this is a reference to various common visualisation techniques used by therapists to imagine an emotion as an orb.

The Vox Bottle in its use context. [28]

- **Dr Vox: Vox Bottle**

The Vox Bottle is a product to aid the Lax Vox voice therapy training technique by humidifying the voice and elongating the vocal tract. User's blow bubbles, often while making tonal noises such that the bubbles in the water held provide a vibrating for vocal tract inertance.

The contraption is a bizarre bulbus thing, with winding tubes and bulges on the side, a colourful embodiment of a Teletubby mixed with face-hugger. The device works well but ultimately, for most users, not much more well than a straw and a cup of water.

The "straw technique" is well documented as having the effect of removing tension from the voice, hydrating the vocal tract and getting rid of the raspy quality of voices, often utilised during a warm-up before training. It is unclear who the device is intended for precisely, a basic Goggle Image search for "Vox Bottle" brings up as many results for Lax Vox as it does images of home-made versions, a plastic bottle with a straw in to the top. Whoever is buying it, the Vox Bottle represents one of very few market products aimed at voice therapy training.

Conclusion and Design Directions

It is my judgement that a miracle, one-size-fits-all solution is likely impossible, and yet it seems there is far more that could be provided by ways of facilitating what is ultimately a highly individual process.

Between price-locked, geography-locked options to the left and right of you, patronising non-solutions from people who seem to you to have 'figured it all out', obscure Reddit threads and broken links to the worst parts of the internet, it is tempting to think that the answer is a single well-kept secret which everybody seems to know more about than you do, feelings of alienation are rife.

It is a deep, despairing frustration at the idea that nothing you can try seems to even leave a dent, that maybe this is it, forever. Maybe it's you who is the problem, maybe you're just making a big deal out of nothing and need to buck-up and try harder, says a voice in the back of your mind.

Providing a contextual framework, autotherapeutic encouragement and perspective building for people in the area of voice therapy training, regardless of capability, level of professional training, end goal, could alleviate this emotional toll and fill the space of facilitation of professional training.

For the beginning of the Unit 10 design project, I defined three core principles of approach:

1) **Visualisation**
   The ability of a user to reflect upon themselves, measure progress, and to analyse their situation to effectively action this perception.

2) **Tools**
   The 'active training' part, a tool or suite of tools to give as much capability as possible to people self-training.

3) **Goals**
   This is an auto-therapeutic approach to allow the user to create perspective, define achievable goals, inspire action, and focuses on the emotional aspects of the process.

   Through these broad lenses it is my objective to create a method of facilitation the individual's journey, empower them with tools to achieve their ends and thus, engender within them as much agency over their voice as can be practically achieved.

VISUALISE   TOOL   GOAL SETTING

Word count excluding bibliography: 5447

Bibliography and References

[1] The terms 'trans feminine / masculine' are depreciated as an individual's masculinity / femininity may not be inferred by their gender. Here they are being used as a stand in for "what would be typically perceived as a masculine / feminine voice by someone training".

Inflection and accent complications mean that accounting for non-English languages is outside of the scope of this project.

[2] (2014) 'MtF Voice Training Regimen by u/TattoedTransgirl' [Reddit]. 10 December. Available at: https://www.reddit.com/r/asktransgender/comments/1ske7b/mtf_voice _training_regimen/ (Accessed: 22/11/2019).

[3] An example of one such video which is better than others but still fails: **Han, A (2016) *How to make your voice feminine. No head voice. No falsetto.* 21 December. Available at: https://www.youtube.com/watch?v=L6ro2R3esHA (Accessed: 16 October 2019).**

[4] @Transsomething (2018) [Twitter] 01 January. Available at: https://twitter.com/Transsomething/status/947867309091192832. (Accessed: 27/6/2019)

[5] From discussion with Christella Antoni

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