

To what extent can an analysis of primary research studies identify the challenges faced by a Down Syndrome singer and contribute to improving vocal training for this demographic?



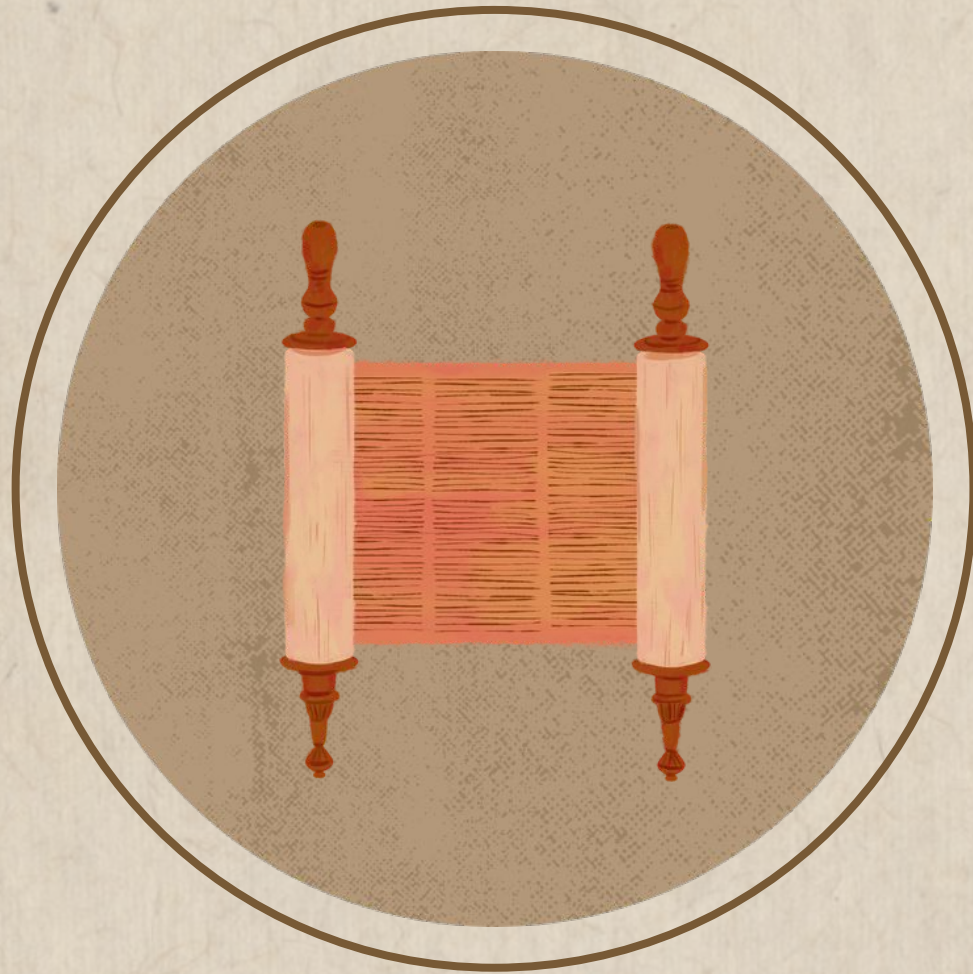
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Introduction

- Vocal tutor to two Down Syndrome (DS) singers
- DS affects operation and quality of spoken voice (Albertini et al, 2010; Krishnamurthy and Ramani, 2020)
- DS singers need focused support
- This work inspired by lack of literature to support DS students and the need to look beyond “the box” for answers (Bannister, 2023, p.2)

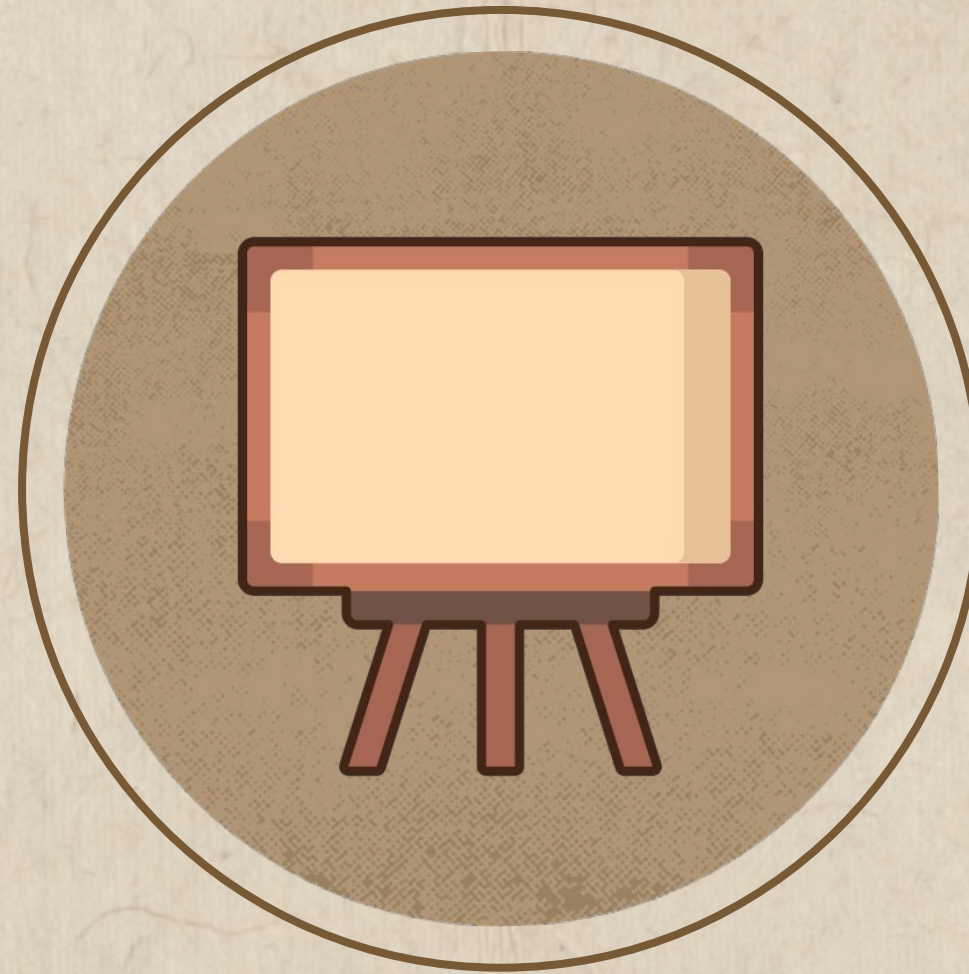
Aims, Objectives and Personal Learning

Goals



Enhance personal knowledge/awareness

- Broaden personal understanding of DS vocal challenges
- Removal of stigma and any prejudice against DS vocalists



Improve tuition

- Enhance tuition for personal DS students, e.g. targeted exercises (previously proven successful)



Contribute to literature

- Contribute to plugging gaps in literature to benefit all DS singers (publish)

Ethics

- This work confined to review of literature. No personal info shared
- Research methods and methodology transparent
- Unfamiliar terminology/concepts studied separately; understanding in context of research (e.g. medical)
- Accurate citations, no retractions, no plagiarism, no repetition of any errors, maintain highest standards of integrity so research can be used by others (Kara, 2019)
- Review all studies equally, no reliance on any study or part thereof to support anticipated or preferred conclusion (Hosseini, 2020)
- Consider ethical implications of applying research to my practice – e.g. manage expectations and time frames for improvement, sensitive approach, seek therapist confirmation of new exercises where appropriate

Methodology and Methods

- Qualitative Evidence Synthesis (QES) – need for comprehensive, cross disciplinary study - may provide answers via analogy or reasonable deduction where no answers available in directly relevant literature
- Hermeneutic framework chosen – adds philosophical depth (Winter, 2023)
- Inclusion/Exclusion criteria. Layered cross-disciplinary searches and back-referencing

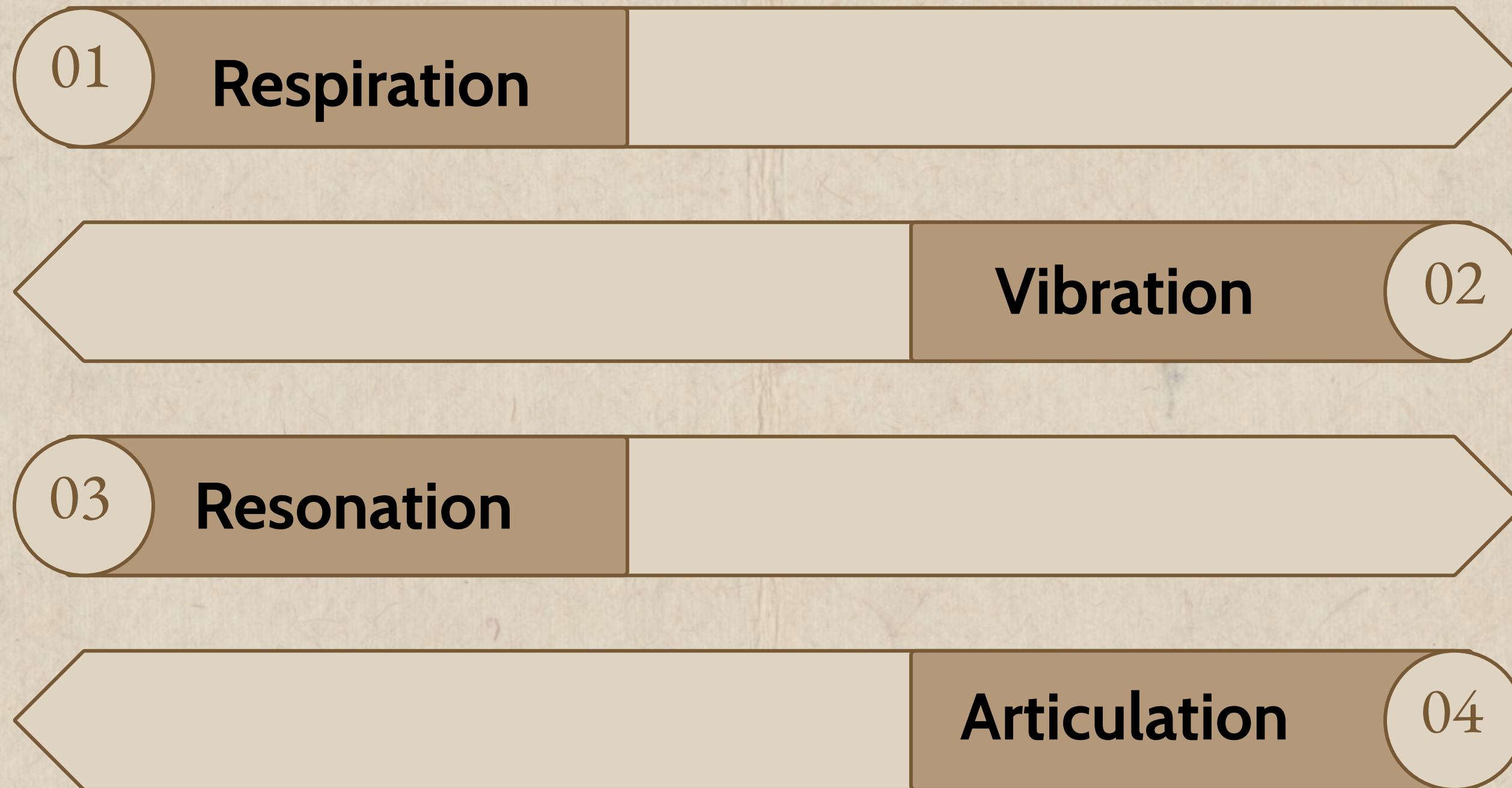
- Thematic analysis using Braun and Clarke model (Braun and Clarke, 2006)
- Pragmatic lens. Pragmatism consistent with interactive and iterative Hermeneutic approach. Aiming for saturation of understanding (Combs, 2010) to advance research
- Principles from Cochrane and Campbell collaborations – systematic reviews (Korfitsen et al., 2020; Li et al, 2003)

Themes Generated Using Braun and Clarke Model (2006)

- Characteristics of DS Voice
 - Respiratory issues in DS individuals
 - Physiological/clinical/ physical features affecting DS voice
 - Production of DS Voice
 - Potential for improvement of DS voice
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Literature Review

Themes generated from Braun and Clarke (2006) model applied to the four stages of vocal production:



(Sundberg, 1988; Miller, 2013; Zhang, 2016)

Respiration

- Miller definition of respiration (Miller, 2013, p.308)
- DS singers face challenges due to reduced lung capacity and weakness of respiratory and accessory muscles (hypotonia)
- Reduction in lung function and capacity due to restrictive lung disorder in children and adults - proven 60% less efficiency for air expulsion/volume/flow rate in adults (Salgueirinho, 2016), consistent with studies on DS children (Laibsirinon et al., 2012). Compromises singing as breath is “foundation upon which singing is established” (Alderson, 1979, p.28; Miller, 2000, p.32)
- Upper airway obstruction – mid-face hypoplasia, macroglossia, narrow nasopharynx, shortened palate, smaller jaw all regulate air flow. Obstructions can't be effectively cleared due to decreased neural input to respiratory muscles (cough) (DeRuisseau et al., 2023)

- Tracheal anomalies – diminished lung surface area and reduced functional reserve
- Common ailments – sleep apnea, stridor, frequent lower respiratory tract infections, hypertension, asthma
- Literature on impact of DS on speech shows it is compromised by respiratory issues (Miller and Leddy, 1998; Casey and Eames, 2011). Reasonable to assume singing similarly affected

Weakness of Respiratory muscles

- Generalised hypotonia (Costa et al, 2015). Lower respiratory strength in adults and in children (Furlan et al., 2015; Değer et al., 2017)
- DS speakers need almost 50% more energy to initiate phonation (Pryce, 1994)
- PNF/RMT targeted exercises have proven effective (Sgariboldi et al., 2014; Costa et al., 2015)

Vibration

- Collagen impact upon vocal cords? Collagen type VI linked to hypermobility – lax joints/muscles and poor control. Dysautonomia.
- Vocal fold immobility caused by common need for cardiothoracic surgery – risk to left recurrent laryngeal nerve in close proximity to aortic arch
- Hypotonia affects laryngeal muscles (Pryce, 1994), contributes to hoarse, low voice characteristics
- Studies on F0 show that DS voices are no different to controls (Michel and Carney, 1964) – pitch perception is inaccurate and listeners misled by other factors (immature physical appearance suggests higher voice). Pentz and Gilbert (1983) study concluded that perception of low pitch due to other acoustical factors – jitter, shimmer etc.

Resonation

- Anatomical irregularities result in limited space and shapes and cause problems adjusting acoustics
- Tongue position and size relative to small oral cavities affects resonant frequencies
- Rough, hoarse voice
- Hypernasality (velopharyngeal dysfunction). Exercises by senior speech therapist, (Kummer, 2006 and 2011)
- Neural issues disrupt accuracy, speed and clarity of voiced sounds (Person et al., 2008)

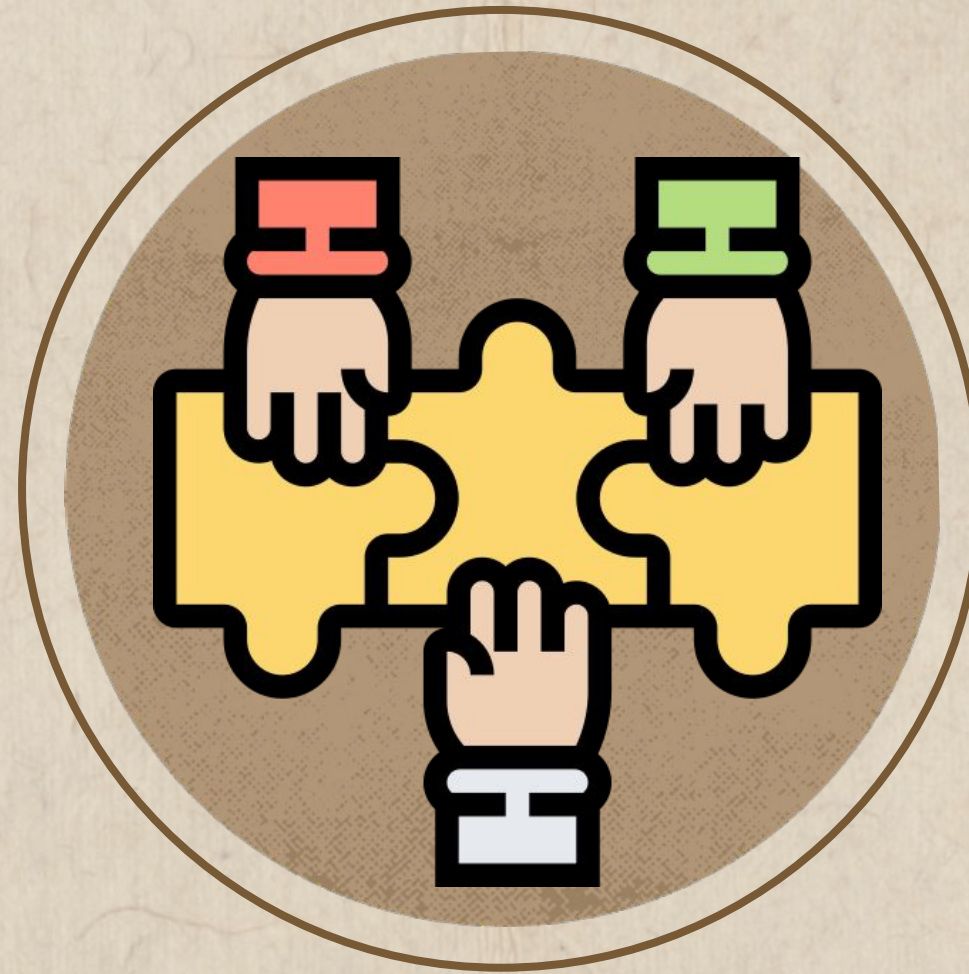
Articulation

- Hypotonia
- Compromised motor skills
- Relative macroglossia
- Impact of small cavity size and craniofacial anomalies significant (Vorperian et al., 2015)

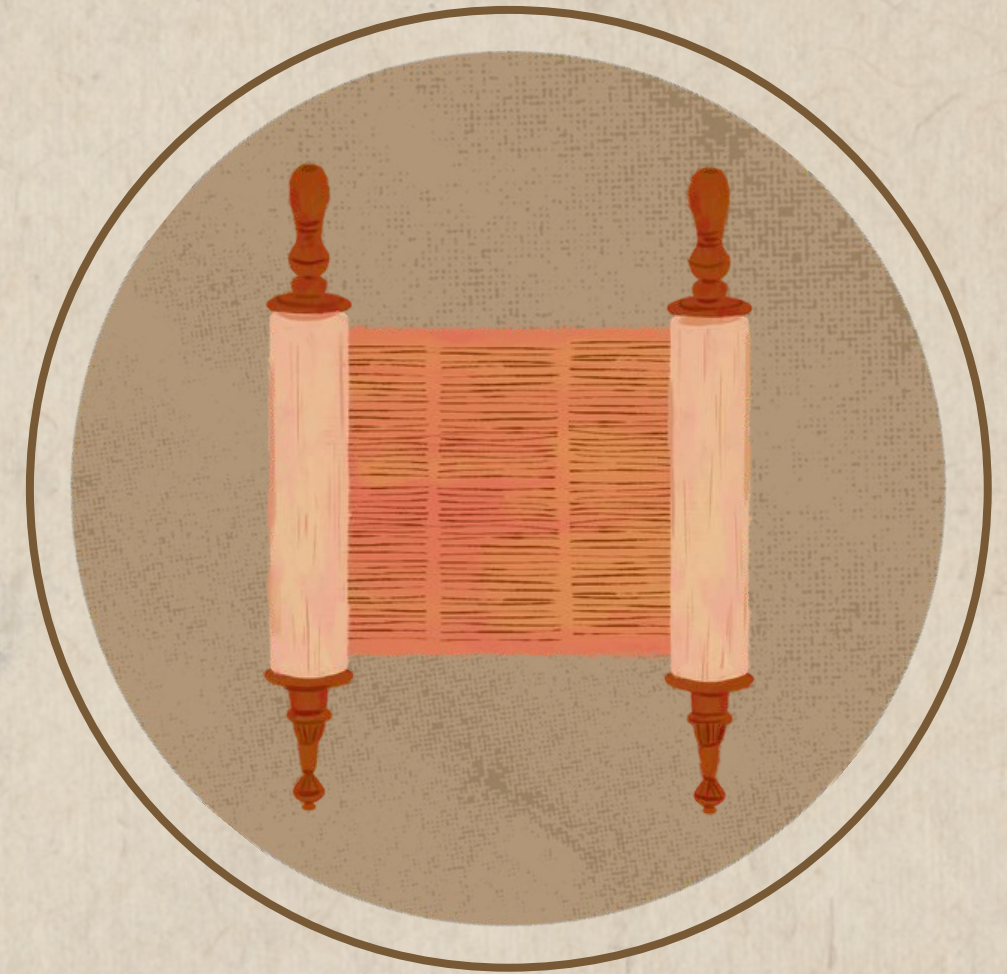
Conclusion



Cross disciplinary research can lead
to sensible deductions and initiatives
for improving singing tuition and
support for DS students



Avoid discrimination and
enable DS individuals to share
in the benefits of singing and
performing



Implications for personal
teaching practice

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