Voice and Age

A cura di:

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Joelle Lucianaz
Martina Solimeo
What is voice?

The sound produced in a person's larynx and uttered through the mouth, as speech or song.
VOICE changing throughout the life!!!

Anatomical changes

Voice quality parameters changes
What Changes

NEWBORN

PUBERTY

ELDERLY

CHILD

ADULTS
**Newborn Voice**

- **F0**: 350-450 Hz
- **CONE SHAPED**
- **HIGH POSITION**
- **SOFT CARTILANANEUS STRUCTURE**
- **SHORT VOCAL FOLDS**
- **VERY LARGE**
- **NARROWER**
- **IT HANGS ABOVE LARYNX**
Uncompleted voice ligament
Until 10 years

Uncomplete 5 layer structure of lamina propria

Thoraco abdominal Diaphragmatic Breathing

Vocal folds length: 6-8 mm
The same for boys and girl until 10 years

F0
280-300 Hz

Child voice
<table>
<thead>
<tr>
<th>Stage</th>
<th>Age</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre muta</td>
<td>8-10</td>
<td>Appearance of breathlessness of voice, decrease of intensity</td>
</tr>
<tr>
<td>Pre menarca</td>
<td>11-12/13</td>
<td>Instability in the vocal range management, decrease in possibility of frequency variation, breathless voice, increase of vocal folds abduction, decrease of intensity</td>
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<tr>
<td>Puberty</td>
<td>13-14/15</td>
<td>Instability in the vocal range management, decrease in possibility of frequency variation, breathless voice, increase of vocal folds abduction, decrease of intensity</td>
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At the end of puberty
Vocal folds' length 17-18 mm

Progressively Fo is similar to the adult one

Hormonal impact
- estrogens
- progesterons
Puberty

Pre-muta

8-11

- instability of voice register
- drastic decrease of Fo

Muta

12-14

Post-muta

15-17

Vocal inreliability

Important change in own vocal representation
At the end of puberty
Vocal folds length
17-18 mm

Significant decrease in Fo

Hormonal impact
- androgens
Adults voice

Vocal folds length: 14-20 mm
F0: 200-250 Hz

Vocal folds length: 15-25 mm
F0: 100-125 Hz
Geriatric voice

Significant Anatomical changes

Intermediate layer of lamina propria becomes looser and thinner

Morphological disorganization and loss of the collagen and elastin fibers

Insufficient vocal folds closure

Stiffness

Decrease tissue

Tremor

Roughness

Reduced vocal loadness
Our study

**What is PRAAT?**

Praat is a free computer software package for the scientific analysis of speech in phonetics.
What is Speech Analysis?

SPECTROGRAM
Spectro-temporal representation of the sound. The horizontal direction represents time, the vertical represents frequency. Darker parts mean higher energy densities, lighter parts mean lower energy densities.

FORMANT ANALYSIS
Analysis of formant, a range of frequencies in which there is an absolute or relative maximum in the sound spectrum. In speech science, a formant is also sometimes used to mean acoustic resonance of the human vocal tract.

PITCH ANALYSIS

INTENSITY ANALYSIS

JITTER SHIMMER

VOICE BREAKS
Our study

METHODOLOGY

Collection of 30 voice samples of healthy voice with smartphones and small voice recorder.

Subdivision of the voices in different groups according to the age and gender.

Measurement of RANGE AGE and MEAN AGE for each group.

Analysis of two recordings for each voice - sustained vowel /a/ - connected speech.
Sustained Vowel /a/

Connected speech

Measurement of two parameters
- Fo
- Intensity

Fo /a/-cs

Statistical analysis

I /a/-cs
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<td>4</td>
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<td>2</td>
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<tr>
<td>Mean age (years)</td>
<td>6.2</td>
<td>6.7</td>
<td>15.8</td>
<td>15.3</td>
<td>33.3</td>
<td>42.2</td>
<td>80</td>
<td>76</td>
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<td>Range age (years)</td>
<td>4-10</td>
<td>4-9</td>
<td>13-17</td>
<td>12-17</td>
<td>25-54</td>
<td>26-58</td>
<td>75-85</td>
<td>69-83</td>
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<td>Mean F0 sv (Hz)</td>
<td>290.27</td>
<td>286.48</td>
<td>215.29</td>
<td>158.13</td>
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<td>138.34</td>
<td>141.09</td>
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## Conclusion

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**Children Fo reference values:** 280-300 Hz

**Adolescents:** Decrease of F0.

**Elderly:** Decrease of F0.

**Adults Fo reference values:**
- Female: 200-250 Hz
- Male: 100-125 Hz
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*Intensity values are similar.*
THANK YOU
FOR YOUR ATTENTION
ITALIAN BOOKS AND ARTICLES

• Silvia Magnani, Franco Fussi – Ascoltare la voce. Itinerario percettivo alla scoperta della qualità vocale – 2008 – Franco Angel

• Silvia Magnani – Il bambino e la sua voce – 2017 – Franco Angeli

• Antonio Amitrano – La voce, uno strumento dei professionisti che promuovono la salute – 2010 – Springer

FOREIGN BOOKS AND ARTICLES

• Paul Boersma and David Weenink – Praat: doing phonetics by computer – praat.org – University of Amsterdam


• Lortie, Catherine L., Mélanie Thibeault, Matthieu J. Guitton, and Pascale Tremblay. “Effects of Age on the Amplitude, Frequency and Perceived Quality of Voice.” Age (Dordrecht, Netherlands) 37, no. 6 (December 2015): 117. doi:10.1007/s11357-015-9854-1.