

RV

Real Time Visual Feedback Voice Training System for Teachers

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Web-supported Learning and Teaching
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Agenda

- Prevalent voice problems among teachers
- RV's assistance in voice training
- RV in depth
 - Basic Flow
 - Theory – **Singer's Formant/Resonance**
 - Tutorials

Voice problems among teachers

- Inability to project loudly
 - Too crowded and noisy classes
 - Incorrect voice usage
- Traditional solutions
 - Stress their vocal cords to project louder
 - Buy an expensive microphone

Voice problems among teachers

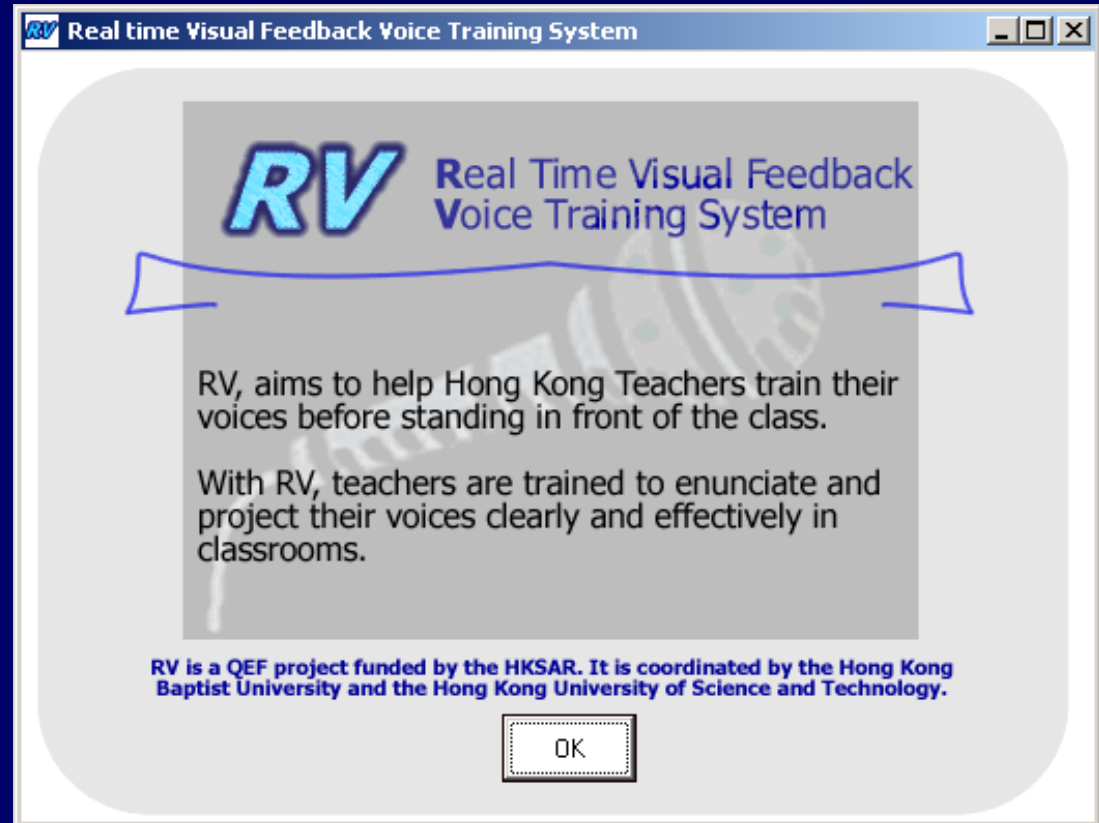
- Vocal abuse
 - any behavior that strains or injures the vocal cords
 - E.g. excessive talking, screaming or yelling
- Vocal misuse
 - improper voice usage
 - E.g. speaking too loudly or at an abnormally high or low pitch

Voice problems among teachers

- Prolonged damage to voice
 - Damage the vocal folds
 - Cause temporary or permanent changes in vocal function, voice quality, and possible loss of voice
- Affect the medium and quality of teaching
- Culprit: unawareness in voice usage

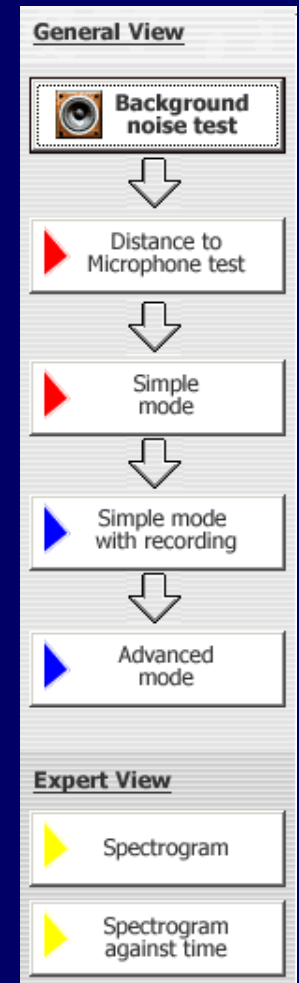
RV - Objective

- Promote the awareness of teachers in correct voice usage
- Assist teachers (visually) in making good voices



RV – Basic Flow

- Basic tests and analysis
 - Background noise test
 - Distance to microphone test
 - Simple voice analysis (simple mode)
- Target at beginners, with simple instructions



Background noise test

- Reduce background distractions
- Keep signal in yellow region
- Beware of "warning"

The screenshot shows the 'Background noise test' window within the 'Real Time Visual Feedback Voice Training System'. The interface is divided into several sections:

- General View:** A vertical sidebar on the left contains navigation buttons: 'Background noise test' (selected), 'Distance to Microphone test', 'Simple mode', 'Simple mode with recording', and 'Advanced mode'. Below these are 'Expert View' options: 'Spectrogram' and 'Spectrogram against time'.
- Background noise test:** The main content area features a horizontal bar with a yellow 'safe' region on the left and a red 'unsafe' region on the right. A green rectangle representing noise level moves from left to right. A red arrow points down to the bar, and a red arrow points up to a 'Threshold' line. A 'Warning!' icon is visible on the right side of the bar.
- Instructions:** A list of instructions: '1. Leave the microphone alone (on the desk).', '2. Warning will be hoisted whenever background noise enters the unsafe red region.'
- Explanation:** A list of explanations: '1. The rectangle goes from left to right with the noise.', '2. Find a quiet environment that keeps the rectangle in the safe yellow region.'
- Navigation:** 'Back' and 'Next' buttons are located at the bottom right.
- Footer:** The bottom of the window contains logos for 'RV Real Time Visual Feedback Voice Training System', 'Hong Kong Baptist University', and 'The Hong Kong University of Science and Technology'.

Distance to microphone test

- Avoid clipping (too big sound)
- Keep signal within acceptable region
- Beware of "warning"

The screenshot shows the 'Distance to Microphone test' interface. On the left is a navigation menu with options: 'Background noise test', 'Distance to Microphone test' (selected), 'Simple mode', 'Simple mode with recording', 'Advanced mode', 'Spectrogram', and 'Spectrogram against time'. The main window displays instructions and an explanation. The 'Instructions' section lists: 1. Speak with the microphone. 2. Try various speaking distances. 3. Warning will hoisted whenever the light exceeds acceptable region. Below this is a visual representation of a microphone's acceptable range, shown as a yellow bar with a green rectangle inside. The green rectangle is currently positioned to the left of the yellow bar, indicating a warning. The 'Explanation' section lists: 1. The rectangle goes from left to right with your voice. 2. Keep the rectangle inside the safe yellow region. 3. If there is warning, move the microphone a bit away from your mouth and test again. At the bottom of the main window, there is a text prompt: 'Proceed to the Simple mode analysis by pressing "Next" or "Simple mode" button.' and two buttons: '<Back' and 'Next>'. The footer contains the RV logo, 'Real Time Visual Feedback Voice Training System', the Hong Kong Baptist University logo, and 'The Hong Kong University of Science and Technology'.

Simple mode

- Instruction
 - get a big circle
- Explanation
 - the bigger the circle, the more effective voice made

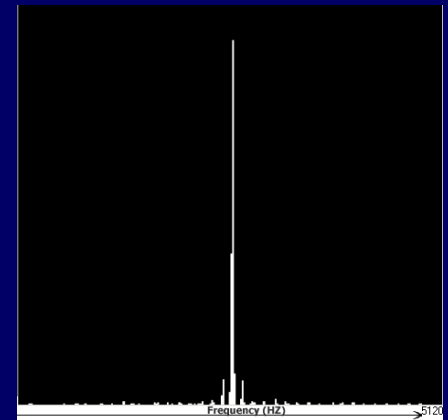
The screenshot shows the 'Simple mode' interface of the RV Real Time Visual Feedback Voice Training System. The window title is 'Real Time Visual Feedback Voice Training System'. The interface is divided into several sections:

- General View:** A vertical sequence of buttons with downward arrows: 'Background noise test', 'Distance to Microphone test', 'Simple mode' (highlighted with a dotted border), 'Simple mode with recording', and 'Advanced mode'.
- Expert View:** A vertical sequence of buttons with rightward arrows: 'Spectrogram' and 'Spectrogram against time'.
- Simple mode:** A large central area displaying a circular visualization of voice data, consisting of many thin lines radiating from the center.
- Instructions:** A text box on the right containing:
 1. Speak with the microphone.
 2. Try to make a big and bright circle.
- Explanation:** A text box on the right containing:
 1. The bigger the circle made, the more effective the voice is.
- Navigation:** '<Back' and 'Next>' buttons at the bottom right.

The footer of the window contains the RV logo and 'Real Time Visual Feedback Voice Training System' on the left, the Hong Kong Baptist University logo and name in the center, and the The Hong Kong University of Science and Technology logo and name on the right.

Singer's formant

- Analysis the sound in frequency domain
 - Lower freq. at left while higher freq. at right
- When we whistle or play some notes from the piano
 - has a specific freq., i.e. a peak is shown only
- How about when we speak or sing?
- Demo

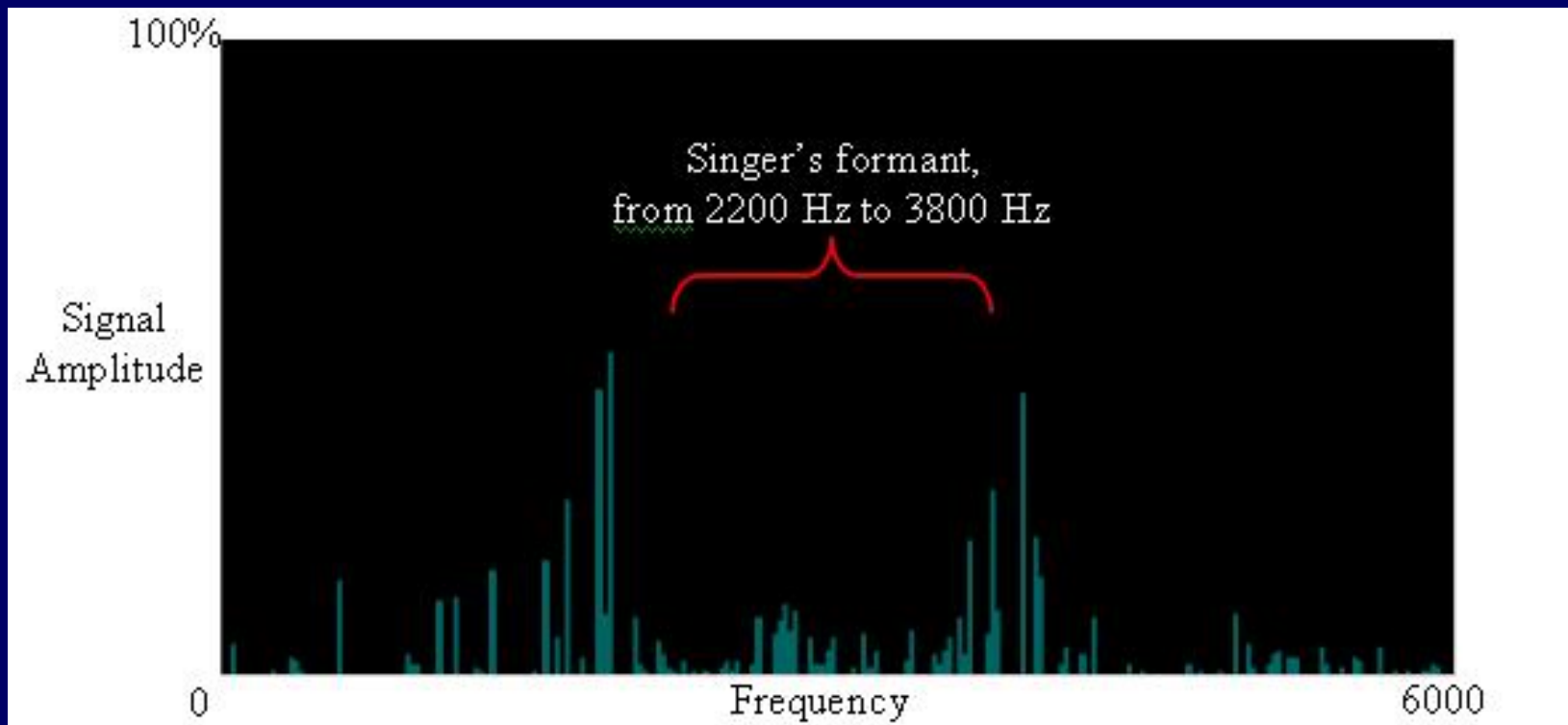


Our whistling

Singer's formant

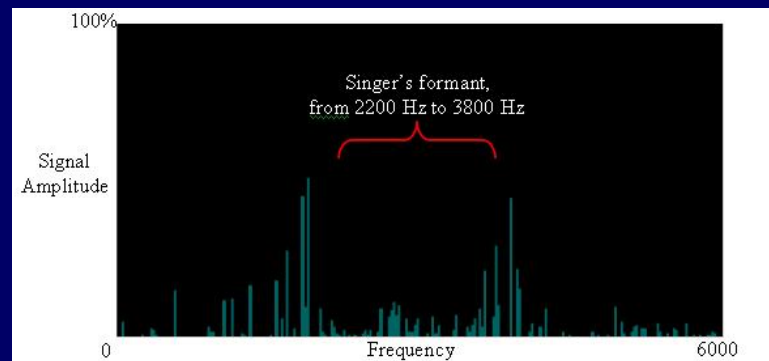
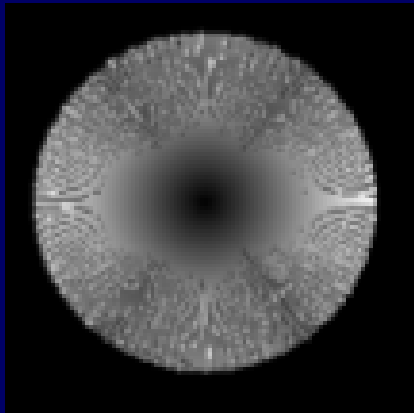
- Singer's formant/resonance
 - from 2.2KHz to 3.8KHz
 - A singer, like a soprano, can be heard clearly, even she is singing with an Orchestra with over 50 musical instruments?
- Singing/speaking falls within this range, will be the most effective

Singer's formant



Singer's formant

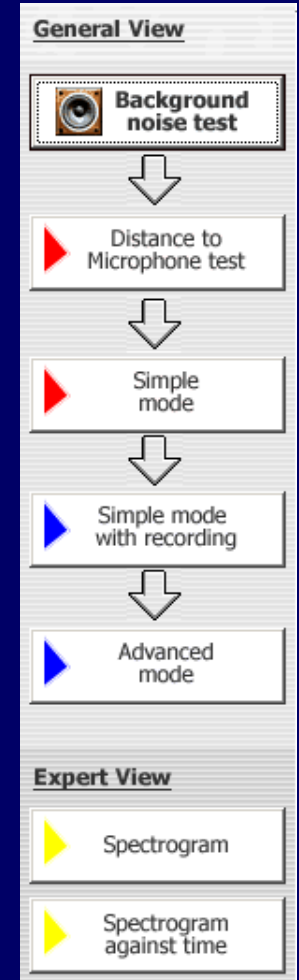
Radius of the circle = bands within singer's formant range out of total bands



- Similarly, it can be interpreted as the level of energy in the singer's formant range attained

RV – Basic Flow, cont'd

- Further analysis
 - Simple mode with recording
 - Advanced mode
 - Expert view
- Target at more knowledgeable users, with more functionality provided



Simple mode with recording

- Play the samples
- Record your own voice

The screenshot shows the RV Real Time Visual Feedback Voice Training System interface. The window title is "RV Real Time Visual Feedback Voice Training System". The main area is titled "Simple mode with recording" and displays a circular spectrogram visualization. On the left, there is a "General View" sidebar with buttons for "Background noise test", "Distance to Microphone test", "Simple mode", "Simple mode with recording" (highlighted with a gear icon), and "Advanced mode". Below this is an "Expert View" sidebar with buttons for "Spectrogram" and "Spectrogram against time". On the right, there is an "Instructions" section with buttons for "Singer A (trained)", "Singer A (untrained)", "Singer B (trained)", and "Singer B (untrained)". Below that is a "Record:" section with "Start" and "Stop" buttons. At the bottom right, there are "<Back" and "Next>" buttons. The footer contains the RV logo and text "Real Time Visual Feedback Voice Training System", the Hong Kong Baptist University logo and name, and the The Hong Kong University of Science and Technology logo and name.

Advanced mode, 1

- Load sound files
- Update setting
 - Bar/line
 - Display duration
 - Axis scale
- Demo

The screenshot displays the 'Advanced mode' interface of the RV Real Time Visual Feedback Voice Training System. The central window shows a bar chart representing 'Vocal Efficiency' on the y-axis (ranging from 0 to 100) against 'Time (s)' on the x-axis (ranging from 0 to 10s). The chart shows two distinct peaks in efficiency, one around 2-4 seconds and another around 8-10 seconds. The interface is divided into several sections: 'General View' on the left with options for 'Background noise test', 'Distance to Microphone test', 'Simple mode', and 'Simple mode with recording'; 'Expert View' below it with 'Spectrogram' options; and a right-hand panel with 'Instructions' for 'Singer A (trained/untrained)' and 'Singer B (trained/untrained)', 'Record' buttons ('Start', 'Stop'), and 'Settings' for file selection, display type ('Bars' selected, 'Lines' unselected), and duration ('10 sec.' selected, '5 sec.', '30 sec.', '1 min.' unselected). The bottom of the window features logos for 'RV Real Time Visual Feedback Voice Training System', 'Hong Kong Baptist University', and 'The Hong Kong University of Science and Technology'.

Advanced mode, 2

- In line display and 30s duration

Real Time Visual Feedback Voice Training System

General View

Advanced mode

Background noise test

Distance to Microphone test

Simple mode

Simple mode with recording

Advanced mode

Expert View

Spectrogram

Spectrogram against time

Vocal Efficiency

Time (s)

100

0

30s

Instructions:

Singer A (trained) Singer A (untrained)

Singer B (trained) Singer B (untrained)

Record:

Start Stop

Played:

Stop

Settings:

File: No file

Open Play

Choose display:

Bars Lines

Set duration:

5 sec. 10 sec.

30 sec. 1 min.

Reset

<Back Next

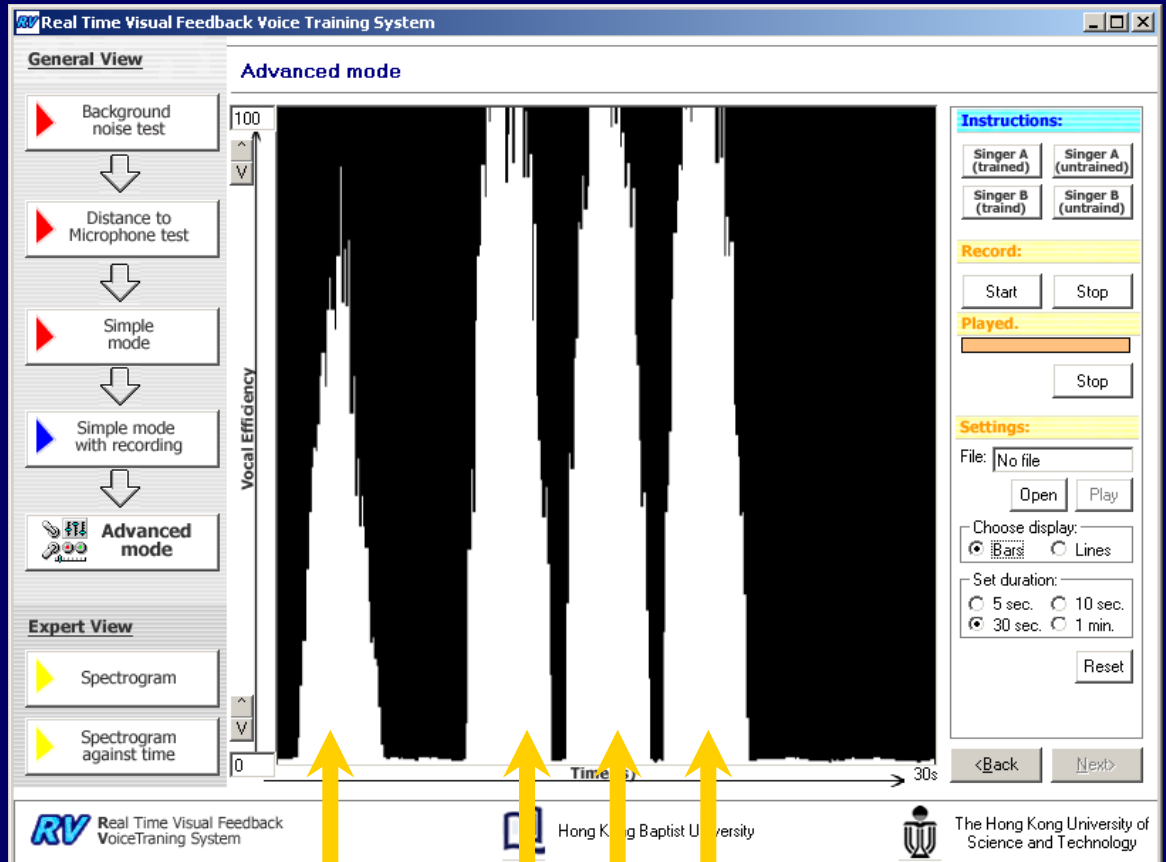
RV Real Time Visual Feedback Voice Training System

Hong Kong Baptist University

The Hong Kong University of Science and Technology

Advanced mode, 3

- Too close distance, "clipping" occurs

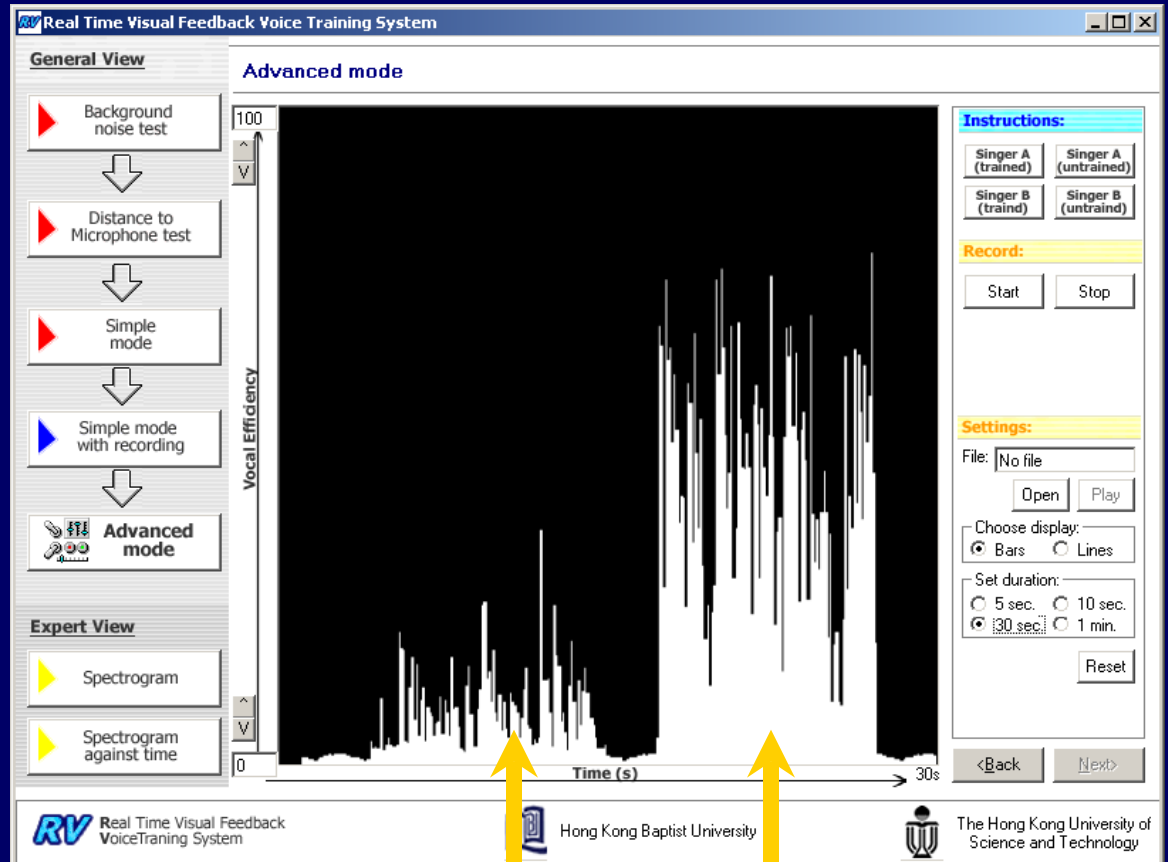


No clipping

Clipping voices

Advanced mode, 4

- Trained vs. untrained voice



Untrained
voice

Trained
voice

Expert view, 1

- Load sound files
- Update setting
 - Display duration
- Showing intensity of voice frequency

The screenshot displays the 'Real Time Visual Feedback Voice Training System' interface. The main window is titled 'Spectrogram' and shows a frequency spectrum plot with 'Intensity' on the vertical axis (0 to 100%) and 'Frequency (HZ)' on the horizontal axis (0 to 5120). The plot shows several distinct peaks, indicating voice frequency components.

The interface is divided into several sections:

- General View:** Contains a vertical stack of control buttons: 'Background noise test', 'Distance to Microphone test', 'Simple mode', 'Simple mode with recording', and 'Advanced mode'.
- Expert View:** Contains two buttons: 'Spectrogram' and 'Spectrogram against time'.
- Instructions:** Includes buttons for 'Singer A (trained)', 'Singer A (untrained)', 'Singer B (trained)', and 'Singer B (untrained)'. Below this is a 'Record:' section with 'Start' and 'Stop' buttons.
- Settings:** Includes a 'File:' field with 'No file', 'Open', and 'Play' buttons. A 'Choose display:' section has radio buttons for 'Bars' (selected) and 'Lines'. A 'Set duration:' section has radio buttons for '5 sec.', '10 sec.', '30 sec.' (selected), and '1 min.'. A 'Reset' button is also present.

At the bottom of the window, there are logos for 'RV Real Time Visual Feedback Voice Training System', 'Hong Kong Baptist University', and 'The Hong Kong University of Science and Technology'.

Expert view, 2

- Showing frequency vs. time

The screenshot displays the 'Real Time Visual Feedback Voice Training System' interface. The main window is titled 'Spectrogram against time'. On the left, there is a 'General View' panel with several test modes: 'Background noise test', 'Distance to Microphone test', 'Simple mode', 'Simple mode with recording', and 'Advanced mode'. Below this is the 'Expert View' panel, which includes 'Spectrogram' and 'Spectrogram against time' (the latter is highlighted). The central area shows a spectrogram with 'Frequency (Hz)' on the vertical axis (0 to 5120) and 'Time (s)' on the horizontal axis (0 to 30s). The spectrogram displays a series of repeating patterns, likely representing a vocal exercise. On the right, there are 'Instructions' for 'Singer A (trained/untrained)' and 'Singer B (trained/untrained)', a 'Record' section with 'Start' and 'Stop' buttons, and a 'Settings' section with options for 'File', 'Choose display' (Bars/Lines), and 'Set duration' (5 sec, 10 sec, 30 sec, 1 min). A 'Reset' button is also present. At the bottom, there are navigation buttons '<Back' and 'Next>'. The footer contains the RV logo, 'Real Time Visual Feedback Voice Training System', the Hong Kong Baptist University logo, and 'The Hong Kong University of Science and Technology'.

RV – Tutorials

- Various references/exercises (to be included in RV)
 - References
 - Proper gesture
 - Correct mouth shape and air usage
 - Maintaining a health voice
 - Speaking exercises
 - E.g. From The John Henny Vocal Studio Inc.
 - let out a siren type of sound ("wooo" or "weee") and feel it go up into the head cavities.



Conclusion

- RV facilitates teachers in voice training
 - Measures the singer's formant
 - Visualizes the sound as simple circles, lines
 - Supports recording for voice improvement
 - Allows various display setting for comparison
 - Provides expert users with spectrograms with detailed information
 - Provides useful tips in correct and healthy voice usage

RV

- Q&A
- Thank you