The Canadian Brass

- Silver Bells
- White Christmas
- The Christmas song
- Winter Wonderland
Introduction

- Why do certain chords or combos of sounds sound good and others not?
- For many it is a tension between familiar and new.
Triads

- Three note chord build on thirds.
- Four kinds: major, minor, augmented, and diminished.
- Major and minor are used most often.
Melody vs. Harmony

- Melody is horizontal
- Harmony is vertical, but also has a horizontal aspect in the sequence or progression of chords.
Major Triad

C    –    E = major third (4 s)
E    –   G = minor third (3 s)
Minor Triad

- D – F = minor third (3 s)
- F – A = major third (4 s)
Diminished Triad

B – D = minor third (3 s)
D – F = minor third (3 s)
Triads

C major

scale number

CEG DFA EGB FAC GBD ACE BDF CEG

1 2 3 4 5 6 7 8(1)

triad number

I ii iii IV V vi vii° I
<table>
<thead>
<tr>
<th>Note</th>
<th>Scale Degree</th>
<th>Degree Name</th>
<th>Triad</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>I</td>
<td>Tonic</td>
<td>C E G</td>
</tr>
<tr>
<td>D</td>
<td>ii</td>
<td>Supertonic</td>
<td>D F A</td>
</tr>
<tr>
<td>E</td>
<td>iii</td>
<td>Mediant</td>
<td>E G B</td>
</tr>
<tr>
<td>F</td>
<td>IV</td>
<td>Subdominant</td>
<td>F A C</td>
</tr>
<tr>
<td>G</td>
<td>V</td>
<td>Dominant</td>
<td>G B D</td>
</tr>
<tr>
<td>A</td>
<td>vi</td>
<td>Submediant</td>
<td>A C E</td>
</tr>
<tr>
<td>B</td>
<td>vii</td>
<td>Leading Tone</td>
<td>B D F</td>
</tr>
</tbody>
</table>
C Major Triad

Root Position - CEG

First Inversion - EGC
C Major Triad

Second Inversion - GCE

Root Position – CE(octave)G
Triad Inversions

CEG

* root position
  first inversion
  second inversion
Demo
Triad Inversions
Consonant vs. Dissonant

- Consonant = pleasant
- Dissonant = harsh
- All possible chords and intervals from the tones in a triad are consonant.
- All others are dissonant.
Which are consonant and which are dissonant?
For the C-E-G triad we have:

- C-E major third
- E-G minor third
- C-G perfect fifth
For the first inversion E-G-C we have:

- E-G minor third
- G-C perfect fourth
- E-C major sixth
Consonant

For the second inversion G-C-E we have:

- G-C perfect fourth
- C-E major third
- G-E major sixth
<table>
<thead>
<tr>
<th>Interval</th>
<th># of Semitones</th>
<th>Character</th>
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<tbody>
<tr>
<td>Unison</td>
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<td>Consonant</td>
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<tr>
<td>Minor Second</td>
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<td>Dissonant</td>
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<tr>
<td>Major Second</td>
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<td>Dissonant</td>
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<tr>
<td>Minor Third</td>
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<td>Consonant</td>
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<tr>
<td>Major Third</td>
<td>4</td>
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<tr>
<td>Perfect Fourth</td>
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<td>Consonant</td>
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<tr>
<td>Aug. 4&lt;sup&gt;th&lt;/sup&gt;/Dim 5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>6</td>
<td>Dissonant</td>
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<tr>
<td>Perfect Fifth</td>
<td>7</td>
<td>Consonant</td>
</tr>
<tr>
<td>Minor Sixth</td>
<td>8</td>
<td>Consonant</td>
</tr>
<tr>
<td>Major Sixth</td>
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<td>Consonant</td>
</tr>
<tr>
<td>Minor Seventh</td>
<td>10</td>
<td>Dissonant</td>
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<tr>
<td>Major Seventh</td>
<td>11</td>
<td>Dissonant</td>
</tr>
<tr>
<td>Octave</td>
<td>12</td>
<td>Consonant</td>
</tr>
</tbody>
</table>
Dissonance

- What makes certain chords sound dissonant?

Demo with pure sounds.
Two sounds or tones are consonant when they are either identical (unison) or well separated.
Critical Bandwidth
Critical Bandwidth

- Region where we hear beats or roughness
- $\frac{1}{4}$ octave rule or minor third.
What is the range of dissonance for \( F_2 = 87.3 \text{ Hz} \) and \( F_6 = 1397 \text{ Hz} \)?

Use Fig. 10.8 to find the third above each which is G#. \( G_2# = 103.8 \text{ Hz} \) so the range is \( 103.8 - 87.3 = 16.5 \text{ Hz} \), whereas \( G_6# = 1661 \text{ Hz} \) and the range is \( 1661 - 1397 = 264 \text{ Hz} \).
Physiological Reason

- If two tones are far enough apart they activate separate nerve cells in the ear.
- If they are close together they activated nerve cells overlap and a mixed signal goes to the brain.
What do we hear if we replace pure tones by real instruments with rich harmonics?

Similar, except there is again roughness at some large intervals such as major sixth.
We need to consider the harmonics of both pitches to understand why.

We will consider only the first 6 harmonics.
Octave

- $f$, $2f$, $3f$, $4f$, $5f$, $6f$, $7f$, $8f$.
- $2f$, $4f$, $6f$, $8f$.
- These either coincide or are widely spaced.
Perfect Fifth

- f, 2f, 3f, 4f, 5f, 6f,
- 1.5f, 3f, 4.5f, 6f, 7.5f, 9f.
- Only two intervals of the more than 10 are closer than ¼ octave. 4f–4.5f and 4.5f–5f.
Perfect Fifth
Harmonics

(Octaves)

(0) (1) (2) (3)

$f_0$ $2f_0$ $3f_0$ $4f_0$ $5f_0$ $6f_0$ $8f_0$

$1.5f_0$ $3f_0$ $4.5f_0$ $6f_0$ $7.5f_0$

0.125 octave

(Frequency)
Major Seventh

- \( f, 2f, 3f, 4f, 5f, 6f, \)
- \( 1.9f, 3.8f, 5.6f, \)

More intervals are closer than \( \frac{1}{4} \) octave. Dissonant.
Fundamental Bass
\[ C = f_1, \quad E = \left(\frac{5}{4}\right)f_1, \quad G = \left(\frac{3}{2}\right)f_1 \]

Let \( f_b = \left(\frac{1}{4}\right)f_1 \) then we get three harmonic series for the three notes. They are:
Fundamental Bass

- C: $4f_b, 8f_b, 12f_b, 16f_b, 20f_b, 24f_b$
- E: $5f_b, 10f_b, 15f_b, 20f_b, 25f_b, 30f_b$
- C: $6f_b, 12f_b, 18f_b, 24f_b, 30f_b, 36f_b$
- We hear a harmonic series of $f_b$!
Chord Progressions

- **Tonic** or I chord
- **Dominant** or V chord
- **Subdominant** or IV chord

These three are called the **Principal Triads**
<table>
<thead>
<tr>
<th>Chord</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>Tonic (I)</td>
<td>C E G</td>
</tr>
<tr>
<td>Dominant (V)</td>
<td>G B D</td>
</tr>
<tr>
<td>Subdominant (IV)</td>
<td>F A C</td>
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</tbody>
</table>
Tonic (I)

- Establishes the key.
- Center of gravity about which the music moves.
- Feeling of release.
- Almost always ends a piece.
- Dominant (V)
- Creates tension.
- Active
Subdominant (IV)

- Midway between Tonic and Dominant in terms of tension and release.
A dominant chord (G B D) with another third added (the seventh) so it would be G B D F. Particularly dissonant and creates great tension. Leading tone.
Cadence

- Progression of chords that leads to a point of repose or end.
- Examples of I-V-I cadences on Studio.
Deceptive Cadence

- Does not end on the chord that you expect.
- Example in book.