• **Dynamics** = loudness or softness of a sound, determined by the amplitude (amount of energy) of the sound. These Italian terms along with their abbreviations indicate to the performer how loud or soft the music should be performed. These are terms are subjective and relative only to each other - there is no absolute, empirical means of indicating dynamic level in current use for performers.

<table>
<thead>
<tr>
<th>Term</th>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pianissimo</td>
<td>pp</td>
<td>very soft</td>
</tr>
<tr>
<td>piano</td>
<td>p</td>
<td>soft</td>
</tr>
<tr>
<td>mezzo piano</td>
<td>mp</td>
<td>medium soft</td>
</tr>
<tr>
<td>mezzo forte</td>
<td>mf</td>
<td>medium loud</td>
</tr>
<tr>
<td>forte</td>
<td>f</td>
<td>loud</td>
</tr>
<tr>
<td>fortissimo</td>
<td>ff</td>
<td>very loud</td>
</tr>
<tr>
<td>crescendo</td>
<td></td>
<td>increasingly louder</td>
</tr>
<tr>
<td>decrescendo</td>
<td></td>
<td>increasingly softer (diminuendo)</td>
</tr>
</tbody>
</table>

**Articulation**

dynamics vary as a sound is played or sung...

Sound Envelope:

```
Attack  Decay  Sustain  Release
```

Energy

```
A  D  S  R
```

Time

Varies per instrument and articulation:

- **staccato** = short
- **legato** = smoothly
- **marcato** = marked

**accent** - to play the attack of a sound extra loud - giving it emphasis
- **Tone color/Timbre** - Every musical instrument and singer has a different tone color/timbre, as determined by its/his/her **harmonic spectrum** and amount of component noise (disorganized sound):

**Harmonic Spectrum:**
For each tone, a fundamental vibration at a constant frequency (\(v\)) is heard along with succeeding multiples of the fundamental frequency known as harmonics, overtones, or partials (\(v, 2v, 3v, 4v, \text{etc.} \)).

Each successive multiple of the fundamental frequency (\(v\)) corresponds to a successive division of the fundamental **wavelength** (\(l\)):
- \(l\) wavelength produces \(v\)
- \(l/2\) wavelength produces \(2v\)
- \(l/3\) wavelength produces \(3v\)
- \(l/4\) wavelength produces \(4v\)
- etc.

The relative intensity or **loudness** (amplitude) of the fundamental and its harmonics (overtones) determines the tone color or timbre of an instrument or voice.

\[
\begin{array}{cccccc}
 & v & 2v & 3v & 4v & 5v & 6v \text{ etc.} \\
I & I & I & I & I & I & I
\end{array}
\]

Differences in the amplitude and harmonic spectrum of the sound as the sound begins (attack), sustains, and then decays also help us to define the sound of an instrument (Attacks often have a very, colorful and distinctive harmonic spectrum).

The tone color of an instrument (or voice) will vary, depending on the how loud or soft it is played. Instruments and voices are used alone or in an infinite array of combinations to give the composer an infinite array of tone colors and timbres to work with.
Notation
(as opposed to an oral tradition or improvised music)
a set of written (graphical) instructions (also referred to as 'the music')
indicates:
  pitch (which one, and when)
  duration (for how long)
  tempo (how fast or slow)
  loudness (how loud or soft)
  timbre (for which instrument or voice)

... thus objective elements.

Various subjective elements may be indicated with annotations or written indications
For example
"with devotion, from the heart to the heart” LvB Missa Solemnis
“ Quickly and warlike” Scottish Symphony IV
“ Devils Dance within me!” Mahler 10 CD

Even without such indications, our own minds *create* the subjective impressions from what we associate with what we hear.

Examples of written music:

```
Allegro, with fervent humor

Violin
```

```
\begin{music}
\begin{staff}
  \begin{ lancet \text{f} \text{p} \end{ lancet } \\
  \end{staff}
\end{music}
```
One of the first music notation systems in Western Society: Neumes

http://www.youtube.com/watch?v=CAmydVsNMqM
Modern Notation

Piano Music – Beethoven: Für Elise

http://www.youtube.com/watch?v=e4BysqPWgfc
Symphonic score... instruments of the orchestra...
http://www.youtube.com/watch?v=jv2WJMVPQi8

Symphony No. 5
Ludwig van Beethoven