INTERVALS

An interval is the distance between two notes: either one heard after the other (a melodic interval), or both heard at the same time (a harmonic interval). For convenience, we usually just refer to either kind as "interval." Intervals are so important (and always an initial part of a music theory curriculum) because so much of how we hear music is about the relationships *between* notes. These relationships are best described by the objective system of intervals. An interval has two components: a number (the distance) and a quality (major, minor, perfect, augmented, or diminished). Examples of intervals in context could be: *major 3rd*, *perfect 5th*, *augmented 6th*, etc.

NUMERIC COMPONENT

The numeric component of an interval is determined by merely counting through the number of notes in terms of their letter names. Because a note can form an interval with itself, the smallest interval is 1 (a "1st", but always called a *unison*). Following this system, we can say, for example, that the interval from middle C to middle C (the same C) is a unison. The interval from C up to D is a 2nd (just count C-D). From C up to E is a 3rd (just count C-D-E) and so on. C up to the next C is an 8th, but we more often refer to that interval as an *octave*.

QUALITY COMPONENT

In addition to their enumeration, intervals have a *quality*, which acts as a modifier to the specific number. There are two basic categories for the five possible qualities intervals can have: *Perfect* and *Imperfect*. Imperfect intervals will be either major or minor. We usually do not refer to intervals as "imperfect", but rather by their specific "major" or "minor" quality.

The same numeric intervals are always limited to the same qualities as follows:

PERFECT	**MAJOR or MINOR**
Unison (1st)	**2nd**
4th	**3rd**
5th	**6th**
8th	**7th**

These intervals are always restricted to these qualities

MAJOR/MINOR

The difference between major and minor is that of size. A major interval is a half step larger than a minor interval. Therefore a 3rd, for example, could be either major or minor. C up to E is a major 3rd, while C up to E flat is a minor third because it is a half step smaller than C to E. Similarly, C sharp up to E is also a minor third because it is a half step smaller that C to E.

AUGMENTED/DIMINISHED

When the size of any interval is expanded or shrunken by a half step beyond the perfect or imperfect (major/minor) parameters, the interval becomes augmented or diminished. A perfect 5th made smaller by a half step becomes a diminished 5th. A major 3rd made larger by a half step becomes an augmented 3rd, while a minor 3rd made a half step smaller becomes a diminished 3rd.

Here is how all the different qualities relate to one and other by size:

The arrow (↔) refers to a change in size by a half step:

Smaller ← Interval → Larger

1st, 4th, 5th, 8th

Diminished ↔ Perfect ↔ Augmented

2nd, 3rd, 6th, 7th

Diminished ↔ Minor ↔ Major ↔ Augmented

Here is the complete list of qualities with their abbreviations:

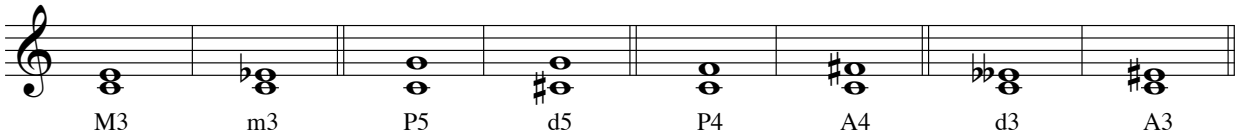
• Major ("M", "maj.")
• Minor ("m", "min.")
• Perfect ("P")
• Augmented ("A", "Aug", "+")
• Diminished ("d", "dim", " º")

Here are some specific examples and further clarification:

- A major interval made smaller by a half step is a minor interval. C up to E is a major 3rd while C up to E flat is a minor 3rd.
- A minor interval made larger by a half step is a major interval.
- A perfect interval made smaller by a half step is a diminished interval (and visa versa). C up to G is a perfect 5th while C sharp up to G is a diminished 5th.
- A perfect interval made larger by a half step is an augmented interval. C up to F is a perfect 4th while C up to F sharp is an augmented 4th.

In rare cases (meaning rarely encountered in real music, but theoretically possible):

- A minor interval made smaller by a half step is a diminished interval. C up to E flat is a minor 3rd while C up to E double flat is a diminished 3rd.
- A Major interval made larger by a half step is an augmented interval. C up to E is a major 3rd while C up to E sharp is an augmented 3rd.



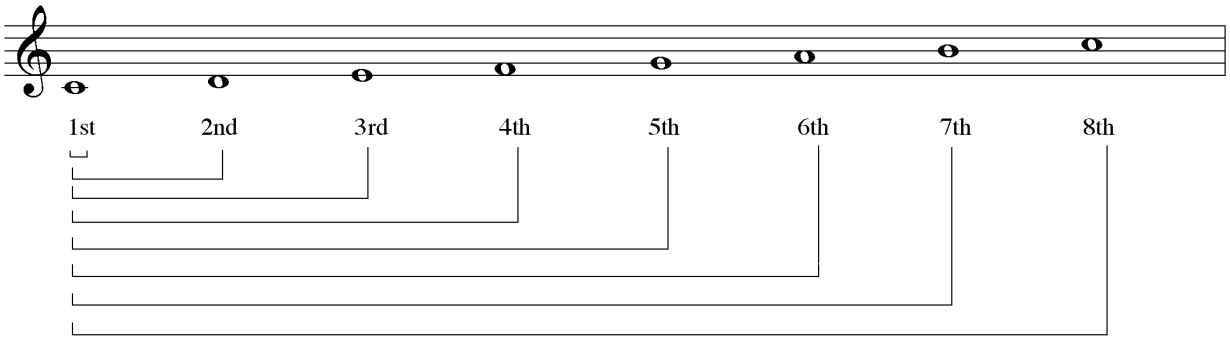
SPELLING INTERVALS

The numeric component of an interval has everything to do with its spelling (which notes are used) because the number is determined by counting through the note (letter) names. While not worrying about quality for a moment, we know enough to say that B up to E sharp is some kind of 4th (count B-C-D-E sharp). The sharp does not actually matter as far as the number is concerned. If the E were a flat instead of a sharp, the interval would still be a 4th (but with a different quality). But in as much as B up to E sharp is a 4th, B up to F is some kind of 5th. Even though E sharp and F are enharmonic (they sound the same), they *spell* the interval in question differently. So the sound of the 4th of B up to E sharp is the same as the sound of B up to F – they are just spelled differently.

MAJOR SCALE CONTEXT

There is more than one way to approach the construction and application of intervals. One elemental approach is to see and hear them in the context of the major scale.

Intervals share their numeric names with scale degrees. For example, the third note in a C scale (E) is an intervallic 3rd above the tonic, C. To put it more simply, E is a 3rd above C (count three notes: C-D-E). A is the sixth note in the C major scale, and therefore a 6th above C (again, count the notes C through A – six notes). So from C through to the next C (the C major scale), we get intervals numbered one through eight.



The notes in the C major scale form these intervals above the tonic (C)

INTERVALS IN THE SCALE

One way to get your head around some of the different qualities that intervals have, and to understand why there are different qualities, is to consider the intervals that are inherent to the basic major and minor scales as we measure those intervals above the tonic.

These numeric intervals have the following qualities in the **major** scale when measured *above* the tonic:

Unison: **P1 (or Perfect Prime: "PP")**
Major Second: **M2**
Major Third: **M3**
Perfect Fourth: **P4**
Perfect Fifth: **P5**
Major Sixth: **M6**
Major Seventh: **M7**
Perfect Octave: **P8**

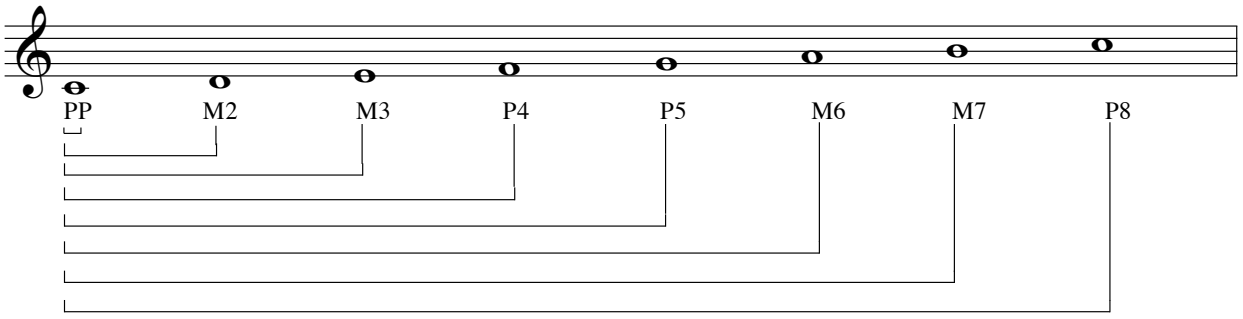
These numeric intervals have the following qualities in the **minor** scale when measured *above* the tonic:

Unison: **P1 (or Perfect Prime: "PP")**
Major Second: **M2**
Minor Third: **m3**
Perfect Fourth: **P4**
Perfect Fifth: **P5**
Minor Sixth: **m6**
Minor Seventh: **m7**
Perfect Octave: **P8**

In addition to these major and perfect qualities, there are the augmented and diminished qualities (found in other scales and in other relationships within the scales).

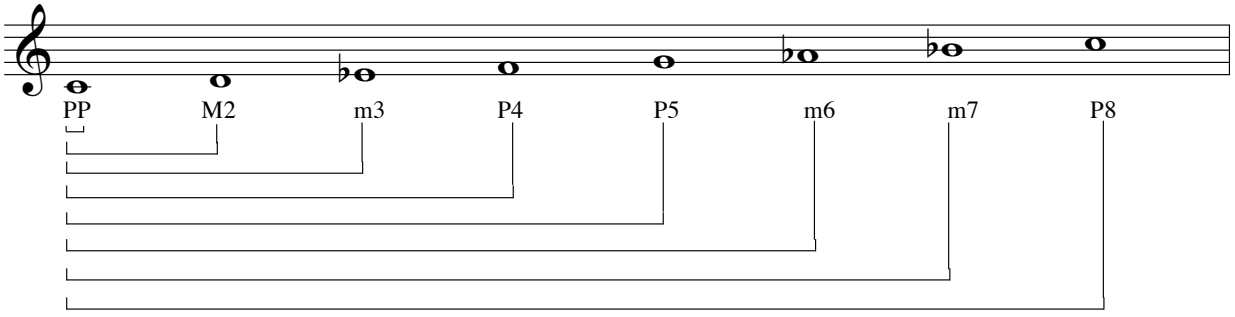
A quick comparison between the C major and C minor scales reveals that (except for the 2nd, which is major in both cases), the non-perfect intervals (3rd, 6th and 7th) are *major* in the major scale and *minor* in the minor scale. There are minor seconds in the scales (from E up to F, and B up to C in a C major scale, for example), but the tonic is never the lower note.

C Major Scale Qualities:



Intervals above the tonic in C major

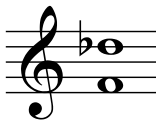
C Minor Scale Qualities:



Intervals above the tonic in C minor

This model works the same for all other major and minor scales.

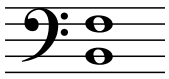
DETERMINING AN INTERVAL I – SCALE BASED METHOD



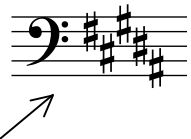
Given this interval, we can determine its size and quality by comparing it to a major scale whose tonic is the same as the bottom note of the interval. Determining the size is easy, just count the notes (the number of lines and spaces) without consideration of any accidentals. F up to D is six notes, so the interval is some kind of 6th. Since only 4ths, 5ths and octaves/unisons are "perfect", this interval's quality should either be *major* or *minor*. Now compare the top note of the interval to the corresponding sixth scale degree of the F major scale (since we refer to the scale that would begin from the bottom note of the particular interval). The sixth degree of the F major scale is D natural…and the sixth degree of any major scale is a major 6th interval from the tonic (major scale = major sixth interval). But here we have a D flat. This is a half step smaller (D natural *down* to D flat) than a major 6th. So the interval is a minor 6th. This process can be simplified by merely comparing the interval to the major key signature of the bottom note. If the notes match up, then the interval is one of the normally occurring intervals in that key.

Here is another one:

B up to F



BM Key Signature



Step 1: B up to F is five notes, so the interval is some kind of 5th
Step 2: Compare to a B major scale or key signature (shown above to the right)

- The fifth scale degree of B should be F sharp. In other words, the F in the key of B major is normally F sharp.
- Since the interval in question is an F natural, the interval is smaller by a half step. The normal perfect 5th (B up to F sharp) is made smaller by a half step into a *diminished* 5th.

Answer: B up to F is a diminished 5th.

Often we will see a symbol "5°" or "4°" used to represent that something is diminished instead of seeing "d5" or "d4".

DETERMINING AN INTERVAL II – HALF STEP METHOD

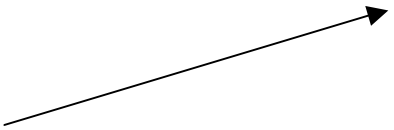
The other way of determining an interval is the half step method. Refer to the chart below which aligns the number of half steps in an interval with the enharmonic (sounding the same) intervals of that size. Above the half steps row are the major and minor scale degree points in alignment with their appropriate number of half steps. For example, the fifth scale degrees of both major and minor scales are seven half steps above their tonics.

Here is a simple procedure for determining an interval:

- Count the number of notes from the first to the second note of the interval (start from the top or bottom–it doesn't matter), which will determine the numeric component of the interval
- Then count the number of half steps between the notes, or compare the notes to how they might appear in the context of a major or minor scale
- However the half steps or the comparison lines up below will give you the interval

Maj. Scale Degree:	1		2		3	4		5		6		7	8		9
Min. Scale Degree:	1		2	3		4		5	6		7		8		9
No. of Half Steps:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

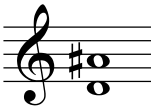
Interval Name:															
	PP	AP													
	d2	m2	M2	A2											
		d3	m3	M3	A3										
				d4	P4	A4									
						d5	P5	A5							
							d6	m6	M6	A6					
									d7	m7	M7	A7			
											d8	P8	A8		
													d9	m9	M9	A9



Key

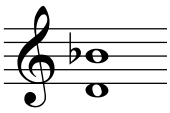
PP = "Perfect Prime" or Unison
d = Diminished
A = Augmented
m = Minor
M = Major

MORE EXAMPLES



For example: this interval counts five notes from D up to A sharp (remember, when we count the notes, we ignore any accidentals – we just count the letters). So D up to A (sharp) is five notes (D-E-F-G-A). The interval is therefore some kind of 5th.

Then we count the half steps from D up to A sharp: there are eight. Looking at the chart, eight half steps in the 5th column is an augmented 5th. We could also notice that the "normal" 5th in either the major or minor scale of D is an A natural (and therefore a perfect 5th). Since this A is sharped, it is a perfect 5th made a half step larger (eight half steps): an augmented 5th!

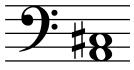
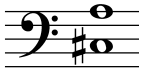


But if the notes were D and B flat, which are also eight half steps apart, the interval would be a minor 6th because D up to B (flat) is six notes (D-E-F-G-A-B). D up to B flat is also the "normal"/minor 6th in the scale of D minor (as shown by the chart). To put it another way, D up to B is the "normal" /major 6th in the D major scale. Since D up to B flat is a half step smaller, the major 6th is made a half step smaller into a minor 6th.

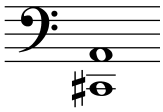
While these concepts can seem confusing, it is all terribly logical and usually just requires a little practice to perfect.

INVERSION

The process of inversion and inverting intervals is among the most fundamental components of music construction. The importance of knowing how to invert cannot be overemphasized, but it is a simple process. To invert an interval is simply to reverse the order of the notes while not changing the actual note names:

 A up to C♯ inverts to 

C♯ up to A

or 

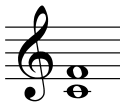
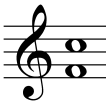
C♯ up to A in a lower octave

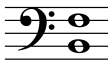
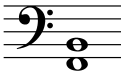
In either case, one of the two notes moved the distance of an octave so that it was on the other side of its counterpart note. The C sharp went down an octave or the A went up an octave. Either result represents an inversion of the original interval of A up to C sharp (a major 3rd). Note that either result above produces a minor 6th interval.

The inversion process is the same for any interval: either the bottom one transposes up an octave or the top one transposes down an octave. The transposition could also be two, three or however many octaves—as long as the notes switch positions.

It is an important process because so often music utilizes inversions to create variety and change (which contribute to the sense of motion and direction!). With inversion, we can take a collection of notes (melody, harmony, or both) and perhaps rearrange them without actually changing them. The rearrangement contributes to the need for change and motion within the music, while the unchanged notes contribute to the continuity and cohesion of the music.

OTHER EXAMPLES OF INVERSION

This interval of a P4:  becomes a P5 when inverted: 

This interval of a diminished 5th (5°):  becomes an augmented 4th when inverted: 

THE INVERSION PATTERN

Every so often there is a wonderful pattern that emerges as a result of music theory "rules." The most elegant seen so far is the circle of fifths. The inversion process also contains a set of perfectly predictable results that are extremely useful. For starters:

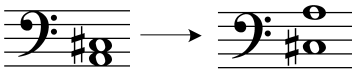
An interval and its inversion <u>always</u> add up to nine
(Interval + Inversion = 9)

AND…

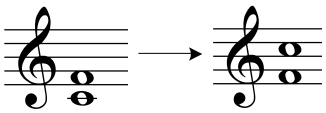
Major	*inverts to*	**Minor**
Minor	*inverts to*	**Major**
Augmented	*inverts to*	**Diminished**
Diminished	*inverts to*	**Augmented**
Perfect	*inverts to*	**perfect**

100% of the time!

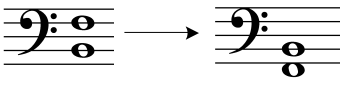
A major 3rd inverts to a minor 6th:



A P4th inverts to a P5th:



A diminished 5th inverts to an augmented 4th:



COMPOUND INTERVALS

A compound interval is any interval larger than an octave, or an interval (second through octave) with an octave added on to it–making it an octave *larger*. Compound intervals are just like ordinary intervals with respect to their qualitative and quantitative components (compounding an interval does not change it's quality). In fact, in most cases we consider compound intervals to be equivalent to their non-compound counterparts, even when the numbers appear different.

For example, a 10^{th} is like a compounded 3^{rd} (a third with an octave added to it), or a 12^{th} is like a compounded 5^{th} (a 5^{th} with an octave added to it). To add an octave to an interval, just add 7. In jazz, however, we do make distinctions between a 2^{nd} and a 9^{th} (a 9^{th} is a 2^{nd} with an octave added to it), a 4^{th} and an 11^{th} and a 6^{th} and a 13^{th}. But in general, the compound interval is the same as its smaller counterpart. A compound interval is similar to a doubled recipe: the proportions of the ingredients stay the same (as does the food's taste), but the overall portion has doubled.

Following through on the recipe metaphor however, we never *triple* the compounded interval. This means that if we take an interval like a 10^{th} and add another octave to it, we DO NOT NORMALLY refer to it as a 17^{th}. We still just call it a 10^{th} – a practical decision for sure. Because of this, the largest interval we will identify is the compounded octave, which we can call a 15^{th} (the octave, 8 with 7 added to it).

Here is a chart of all the compounded intervals we might encounter (remember that the issue of quality does not change in a compound situation: a compounded *major* 3^{rd} is a *major*10^{th}):

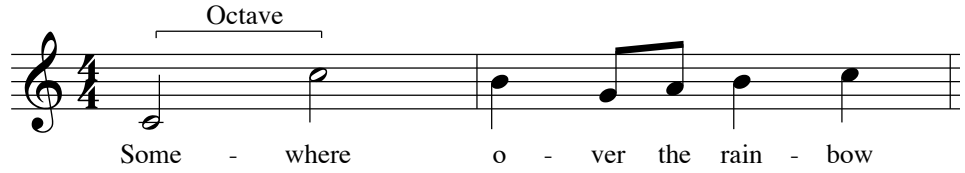
Interval	**Compounded**
2^{nd}	9^{th}
3^{rd}	10^{th}
4^{th}	11^{th}
5^{th}	12^{th}
6^{th}	13^{th}
7^{th}	14^{th} (not used)
octave	15^{th}

HEARING INTERVALS

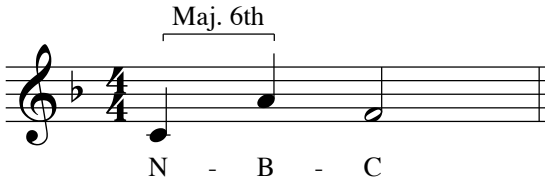
We do not realize how much we already know about music; it's just that we often do not have the musical name for that which we know. For example, there are so many songs, tunes and melodies in our heads, that we implicitly have their intervals in our heads as well. If we can attach an interval name to a portion of a melody that we can recognize and sing, we can consequently recognize and sing that interval.

Here are some examples:

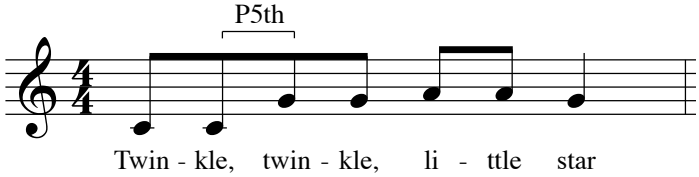
The Octave: ***Somewhere over the Rainbow***



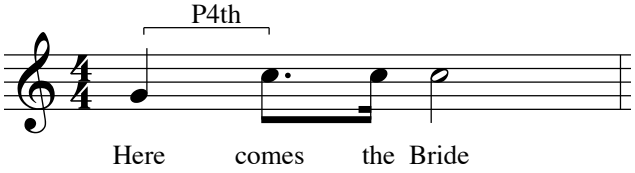
The Major Sixth: the *NBC* TV sound byte



The Perfect Fifth: ***Twinkle, Twinkle, Little Star***

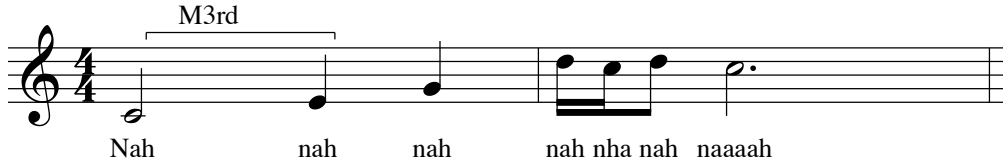


The Perfect Fourth: ***Here Comes the Bride***

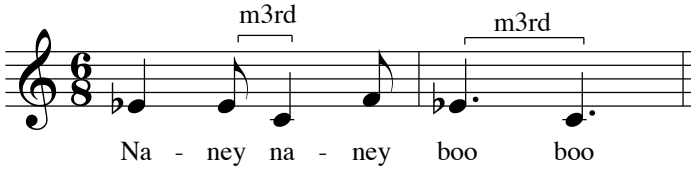


MORE EXAMPLES

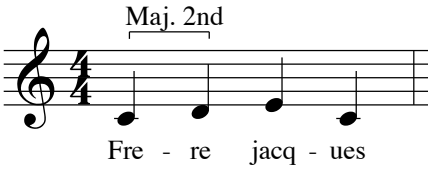
The Major Third: the "Nah Nah" part of *Hey Jude*



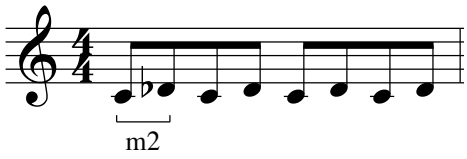
The Minor Third: *Nanny Nanny Boo Boo*



The Major Second: *Frére Jacques*



The Minor Second: *Jaws...*



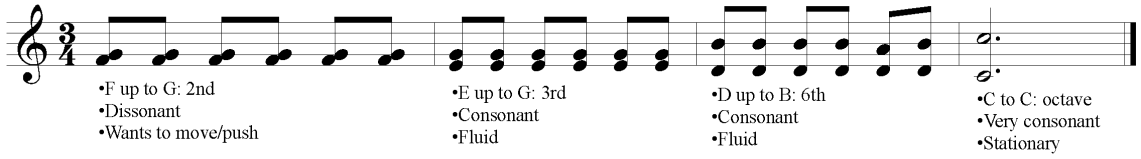
Applications for Intervals

Harmonic intervals (when two notes sound at the same time) can be classified as *dissonant* or *consonant*.

- **Dissonant** harmonic intervals: are considered unstable and create the feeling that they need to resolve (i.e. move to a more consonant/stable interval).
    - 2nds, 4ths, 7ths, augmented/diminished intervals of any size

- **Consonant** harmonic intervals: are considered either fluid (better supporting a sense of comfortable motion), or very-stable/stationary (better supporting a sense of stasis, stopping or rest).
    - **Fluid**: 3rds, 6ths
    - **Stationary**: unisons, perfect 5ths, octaves

These various characteristics are useful for affecting the forward-moving, progress-oriented tendencies of Western music. Dissonance is used to push forward (resolve) into consonance. The song *Chopsticks* uses dissonance and consonance in this way. It begins with a dissonance (the 2nd) and unfolds towards a stationary consonance (the octave, on the tonic no less) via fluid consonances. The fulfilled "goal" of the music (the final octave) is a consonant, stable resting place.



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Melodic intervals (where the notes sound consecutively) are not as sensitive to consonance or dissonance since the two notes are not heard simultaneously. But such intervals have a high melodic profile and can be used in compositions to help string ideas together and establish a sense of continuity as the music unfolds. The opening (and very recognizable) theme of Beethoven's 5th Symphony relies mainly on melodic 3rds.