FOUNDATION AND PRACTICE OF MUSIC

GIANLUCA BARBARO

Gianluca Barbaro

Foundation and Practice of Music

Musicalia 1

Table of contents

2.2 HUMAN SOUND PERCEPTION

For the sake of simplicity, let's define our musical "ear" as the compound result of the cooperation between:

a) our actual, physiological ears, with all their anatomical parts;

b) the part of our nervous system that transports, processes and analyses what is perceived by the ears (i.e. the nervous components of the ears, the auditory nerves and the part of the brain cortex devoted to the elaboration of impulses from the ears) and then presents some result to the Self;

c) the (partially) conscious Self that "listens" to the "sounds" so presented in point b).

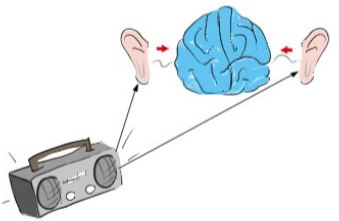

FIG 5: HUMAN SOUND PERCEPTION

It appears that our ***musical ear*** (as defined above) is able to identify (consciously or not) even fine structures in the perceived acoustical material and, generally speaking, always appreciates when some "order" is found. In other words, our ear loves regularity and structures.

On the other hand, it is imperative to consider the fact that our ear is equally prone to boredom: once it identifies a structure (in a rhythm, a harmony, a melody, a timbre, a scale or any combination of the above), it values its repetitions only to a certain extent, after which it starts losing attention. From this point of view, we could say that a piece of music is effective when it gives the ear a well-balanced amount of structure, repetition but also variation and novelty.

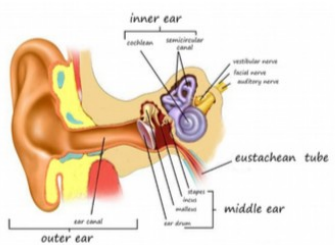

FIG 6: HUMAN EAR ANATOMY.

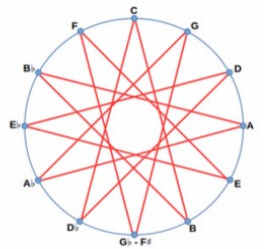

Fig 10: Cycle C1 - Chromatic

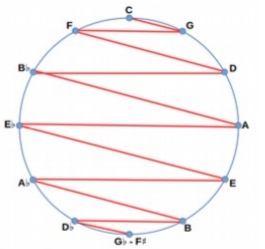

Fig 13: Cycle C4 - Number of alterations

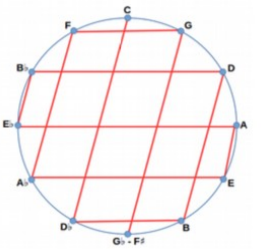

Fig 14: Cycle C5 - Chromatic up and down

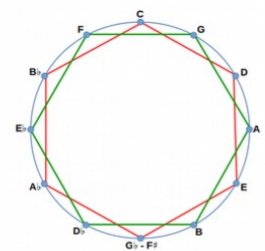

Fig 12: Cycle C6 - Major seconds

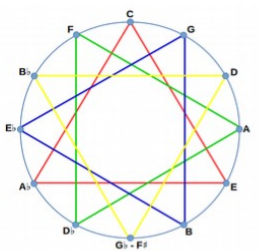

Fig 11: Cycle C8 - Major thirds

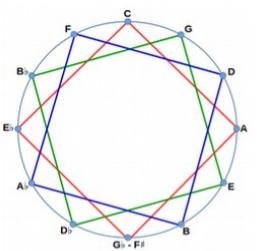

Fig 15: Cycle C7 - Minor thirds

5.1 The infinite loop between Chords & Scales

We can now expose a key property of our system:

> *A* scale *is a sequence of notes generated by taking a chord plus a choice of tensions, so to have at least five notes at a maximum distance of a perfect fourth between each consecutive step.*

For example (Fig. 38), if we take a C major triad and we "fill the gap" between C and E with a D, and an A between G and the octave of C, we obtain a 5-tone scale (a ***major pentatonic*** scale of C). Or, if we consider a CΔ, add a D, an F and an A to fill the gaps and order the seven notes, we have C major scale.

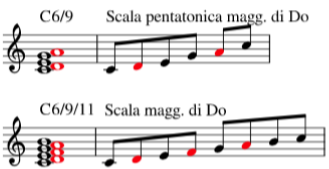

Fig 38: Examples of scale generation by adding tensions to a chord

On the other hand, we could see a seventh chord as something generated from a scale by picking a starting point (fundamental) and moving up by third intervals (major or minor). For example, in a C major scale we start from the C, move up a third and add an E, then another third for a G a finally another third for a B, we have a CΔ: the remaining notes of the scales will serve as tensions of the chord. So we have that:

> *A* chord *is a set of notes generated by taking a scale minus a choice of steps, so as to have at least three remaining notes at a maximum distance of an augmented fourth.*

As already hinted in Chapter 3, chords and scales are really like the chicken and the egg: we can derive one from the other and vice-versa. Or are they?

Let's examine the movement of a bouncing ball, as shown in Fig. 91. We all know that the vertical speed after a rebound gradually decreases because of the contrary gravitational force, until it reaches a plateau where the ball stops ascending and starts descending. On the descent the vertical speed gradually increases because of the favorable gravity force. As human beings, we evolved in gravity and we know very well how to evaluate its effects on bodies in general and on our body in particular. All games and sports based on balls (and most of the others) are based on our innate knowledge of gravity. By observing the trajectory of a ball, we are generally capable of foreseeing its development and make predictions on where it will land and how much force it will carry.

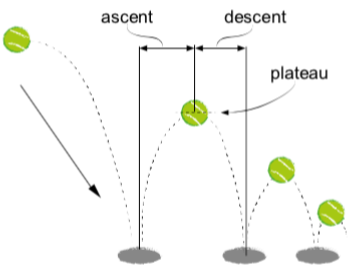

FIG 91: A BOUNCING BALL

Returning to our couple of adjacent notes, the moment we release the first note corresponds to the plateau of a bouncing ball: if it arrives at the right point, we can predict its "fall" onto the next note. Considering that the ascent lasts longer than the descent because of gravity effects, we have an explanation of why in dance music we often find inequality (see section 7.7): the asymmetry between downbeats and upbeats retraces the asymmetry between lifting and dropping a foot or a leg, thus helping and better accompanying dancers in their steps.

If we release the first note sooner or later than the "natural" point, we give a different information to the brains of listeners and their previsions on the next "impact" will differ accordingly.