Center of Oscillation

Ramsay

"A point on a pendulum two-thirds of one third the length of the string, *i.e.*, suspension from which point giving the highest rate of vibration." Ramsay, Dougald Carmichel; [Scientific Basis and Build of Music; Marcus Ward & Co., Ltd., New York, 1893.]

An elongated uniform body, *e.g.*, a dressed lath of pine, has three primary centers - the center of *gravity*, the **center of *oscillation***, and the center of *velocity*. The center of gravity is the center of the body; the **center of oscillation** is at two-thirds from the end as the point of suspension; the center of velocity is at *two-thirds of one-third* from the end, *i.e.*, at *two-ninths* from the end as the point of suspension. [Scientific Basis and Build of Music, page 92]

"This elongated body suspended at the end, or at one-third from the end, the oscillations are the same. The one-third above the point of suspension so balances the two-thirds below that the oscillations are performed in the same time for both suspensions. When it is suspended at two-thirds of the one-third. i.e., one-ninth of the whole length above the **center of oscillation**, one-ninth above balances two-ninths below; the oscillating part is thus, as it were, one-ninth shorter than at the **center of oscillation**, and gives rise to the center of *velocity*." [Scientific Basis and Build of Music, page 92-93]

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are always when they have returned to the side from which they were started. The Pendulographer, also, when writing the beautiful pictures which the musical ratios make when a pen is placed under the control of the pendulums, always finds his figure to begin again when the pendulums have finished their period, and have come for a fresh start to the side from which the period began. This confirms our author's definition of an oscillation of a pendulum. Fig. 3 is an illustration of the correct definition of a Musical Vibration, as also given in this work. Although the definition of an oscillation is not identical with that of a vibration, yet on account of their *movement in the same ratios* the one can be employed in illustration of the other as we have here done. Fig. 4 is a uniform rod suspended from the end as a pendulum; it will oscillate, of course, at a certain speed according to its length. In such a pendulum there are *three centers* related in an interesting way to the subject of Music in its three chords - subdominant, tonic, and dominant, which roots are F, C, and G. The center of gravity in the middle of the rod at 2, suspended at which the rod has no motion, corresponds to F, the root of the subdominant, in which there is the maximum of musical gravity. The **center of oscillation** at 3, which is one-third of the length of the rod from the end, is like the root of the tonic whose number is 3 in the genesis of the scale from F1. In this point of suspension the oscillations are the same as when suspended from the end at 1. The point at 9 is at a *ninth* from the **center of oscillation**. Our author discovered that, if suspended at this point, the pendulum had its highest rate of speed. Approaching the end, or approaching the **center of oscillation** from this point, the rate of speed decreases. Exactly at one-ninth from the **center of oscillation**, or two-ninths from the end, is this *center of velocity*, as Ramsay designated it; and it corresponds in some sort also to the root of the dominant G, which is 9 in the genesis of the scale from F1; its rate of vibration is nine times that of F1. The dominant chord is the one in which is the maximum of levity and motion in music. [Scientific Basis and Build of Music, page 105]

[Mechanical] That point in the axis of a vibrating body in which, if the whole matter were concentrated, the body would continue to vibrate in the same time. It lies in the same axis as the center of gravity, but is necessarily situated farther from the point of suspension. (Horner, J. G. ; Dictionary of Terms Used in Mechanical Engineering; The Technical Press, Ltd., London, England, 1960)

See Also

Center
Center of Gravity
Center of Moments
fulcrum
middle
Neutral Center
Pendulum
two-thirds of the one-third