Dynamic Forces Rotational Dynamics - Part 2

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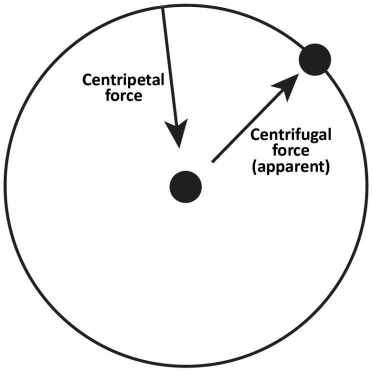
Dynamic forces of motion are an aspect of ballroom dancing that always needs to be taken into account. The concept of momentum as it relates to partners moving together along the dance floor in a straight-line path was discussed in the last issue. Momentum was defined as the product of mass times speed (mv) in the direction of travel. This article will highlight the dynamic forces that are generated as a result of rotational movements.

Visualize an ice skater spinning continuously about one point on the ice. The skater experiences various rotational forces, also known as angular forces. These kinetic forces are inherent in all rotational movements. Ballroom dancers experience the same forces while dancing any curved or turning movements. Managing the natural forces that result from this type of motion relies on a kinesthetic sensory skill that allows one to know where their body is spatially at any given instant. Refining these skills enables dancers to execute rotational movements with greater spatial exactness on the dance floor.

Rotational forces are perhaps the most challenging to manage. They are dynamic and can therefore change instantaneously in magnitude and direction. These movements generate a force known as centrifugal force that pushes an object outward and away from the center of rotation. Likewise, there is an opposite force generated known as centripetal force that pulls an object in toward the center of rotation. These forces are equal and opposite and proportional to the rotational speed and mass of an object traveling around a curved path. This motion results in rotational or angular momentum. To illustrate this point, let's visualize a spinning bicycle wheel. Locate the spot closest to the center of the wheel and then extend an imaginary line to the rim of the wheel. From this we see that the center of the wheel is the center of rotation, also known as the axis of rotation. The rim of the wheel is the point furthest from the center. An object that is situated furthest from the center, at the rim in this example, has to travel faster and hence will cover more distance as compared to an object that is closest to the center of the wheel. This analogy can be directly applied to describe the inside and outside of a turn. In the context of ballroom dancing, one partner has to move faster and over a greater distance while on the outside of the turn, i.e., furthest point from the center. At the same time the other partner who is on the inside of the same turn covers less distance and moves at a slower speed. From this, we can begin to see the significance of how two dancers have to constantly adjust to varying degrees of angular momentum exerted on their bodies as a direct result of where they are positioned in the turn at any given instant.



Viennese waltz is a unique smooth ballroom dance that differs from slow waltz, in that partners travel down the line of dance while constantly orbiting around each other. Each partner makes a continuous transition between the outside and inside of each turn respectively. Both partners have to stay in balance with each other throughout this travel and turning process. They will both experience variable amounts of angular momentum throughout the dance. The amounts of turn and speed in each of the turns change constantly and independently for both partners. One partner has a longer circular path as the other has a shorter path and then vice versa. For example, in the first half of the Viennese waltz left turn, the leader is on the outside of the turn. This puts him farther from the axis of rotation where he will experience the outer directed centrifugal force with greater rotational momentum in this movement. During the second half of the turn, he will be on the inside of the turn where he will experience the inner-directed centripetal force. The follower experiences the opposite throughout the dance.

Rotational forces are always present as partners dance turning movements. Cultivating kinesthetic awareness of these kinetic forces of motion takes time to develop and refine. It is one of the finer aspects of dancing that will afford a greater degree of precision and stability while dancing turning movements.