

Abstract

► **Dapena, J. and C. McDonald. A three-dimensional analysis of angular momentum in the hammer throw. *Med. Sci. Sports Exerc.* 21:206-220, 1989.**

Eight hammer throwers were studied using three-dimensional cinematography. The local term of angular momentum of each thrower (*HTL*) followed a wide conical path, while the remote term (*HTR*) and the hammer angular momentum (*HH*) followed much narrower conical paths. *HT*, the sum of *HTL* and *HTR*, followed a conical path similar to that of *HTL*, although with smaller amplitude. *HH* was half a cycle out of phase with *HT*. It was also larger, but followed a narrower conical path. As a result, the conical paths of *HH* and *HT* counteracted each other, and *HS*, the total angular momentum vector of the thrower-hammer system, had little conical motion. The paths of the angular momentum vectors, the trunk tilt, and the height of the hammer plane relative to the system center of mass were interrelated. Some throwers kept the hammer plane high and the trunk tilting back in all the turns; other throwers kept the hammer plane low and the trunk tilting forward in the early turns, but the hammer plane rose in their late turns, and the trunk tilted back. Two theories were proposed to explain why the athletes who had forward trunk tilt in the early turns tilted backward in the final part of the throw.