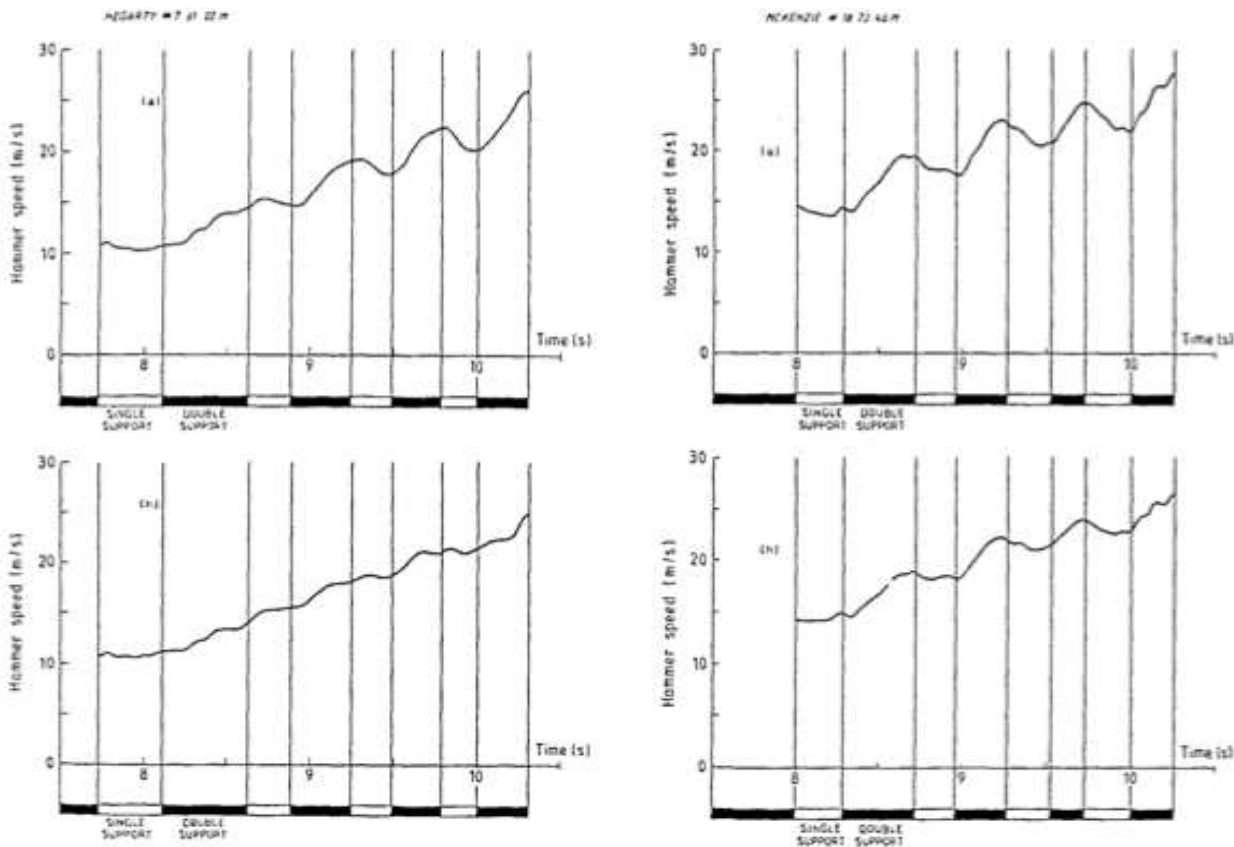




# Hammer

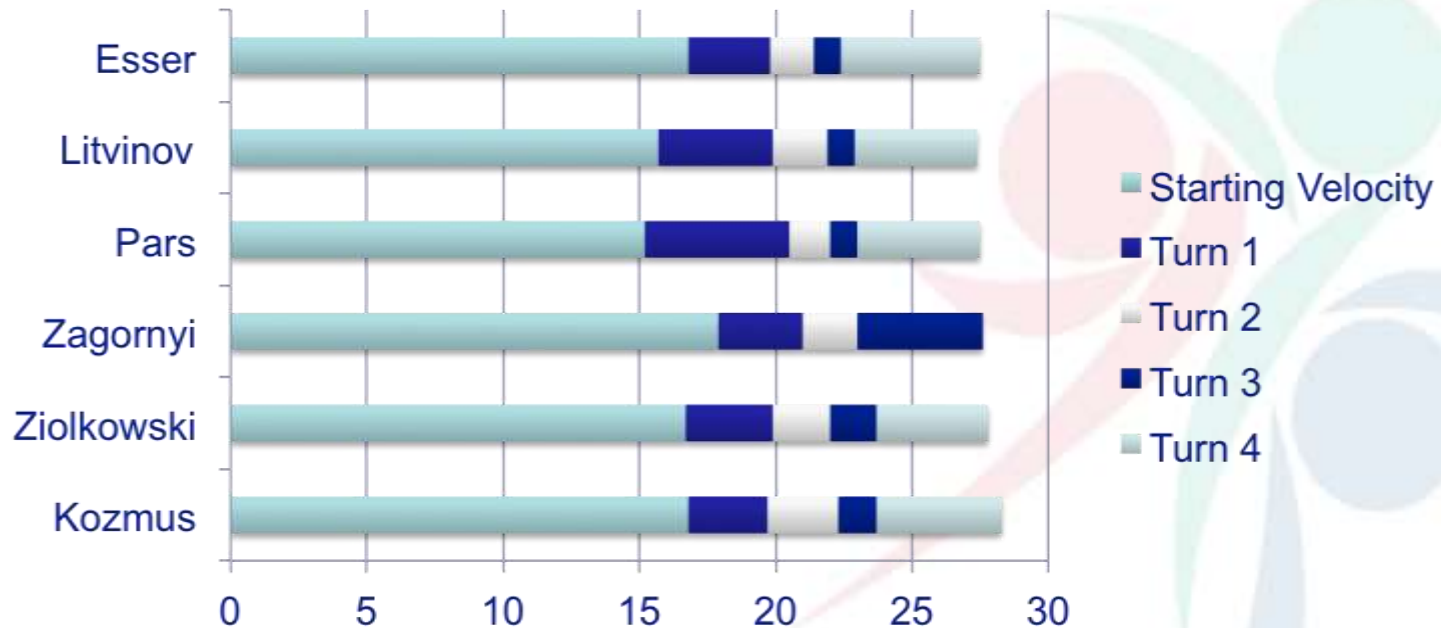
Don Babbitt

## Acceleration Path for the Hammer Throw



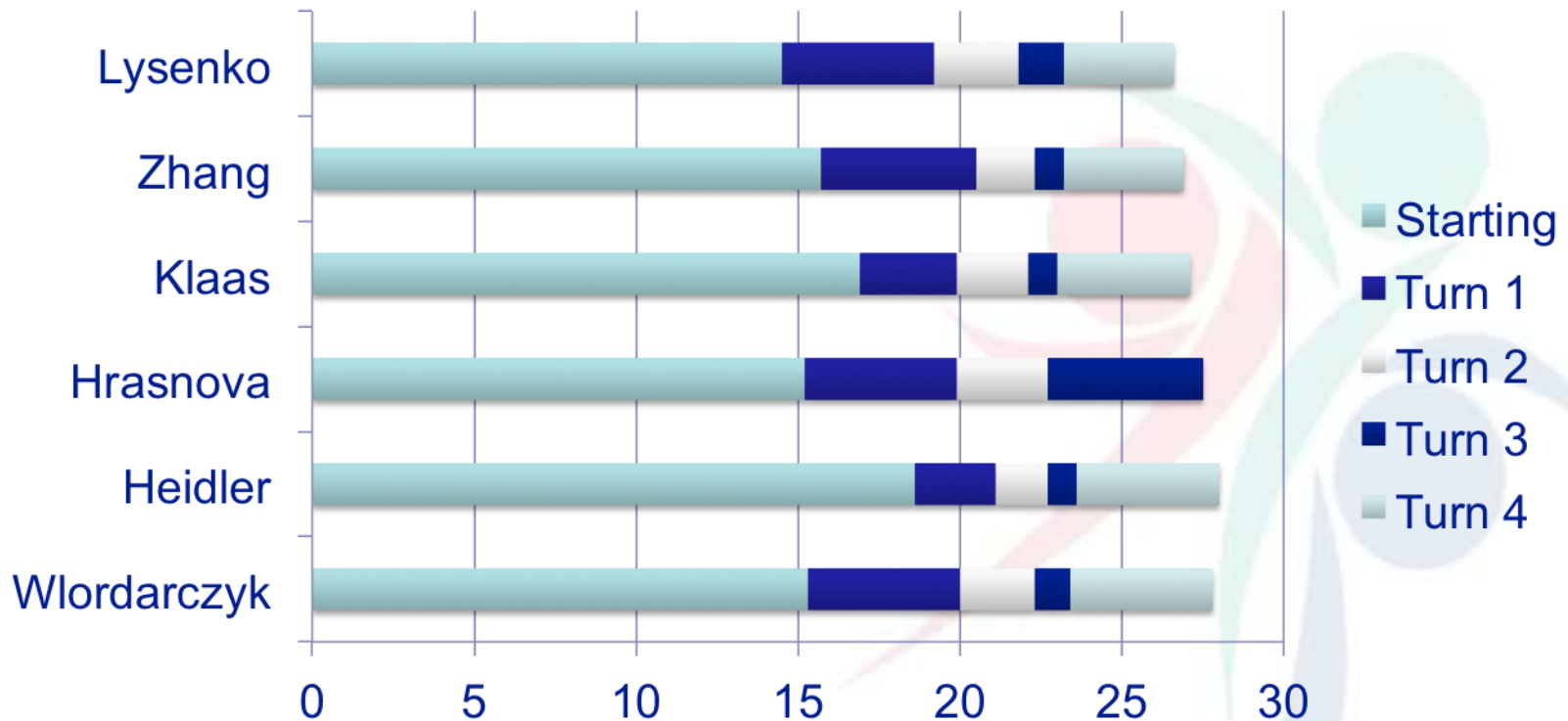
From: Dapena 1989, in Athletics Coach

## Increase of Hammer Velocity During Turns: MEN



From: Isele & Nixdorf, Biomechanical Analysis of the Hammer Throw  
at the 2009 IAAF World Championships in Athletics

## Increase of Hammer Velocity During Turns: Women



From: Isele & Nixdorf, Biomechanical Analysis of the Hammer Throw at the 2009 IAAF World Championships in Athletics

## Control and Maintenance of the Center of Mass

- Center of Mass & Low Point
  - Stable Height
- Center of Mass & High Point
  - Asynchronous movement between CG and hammer-head

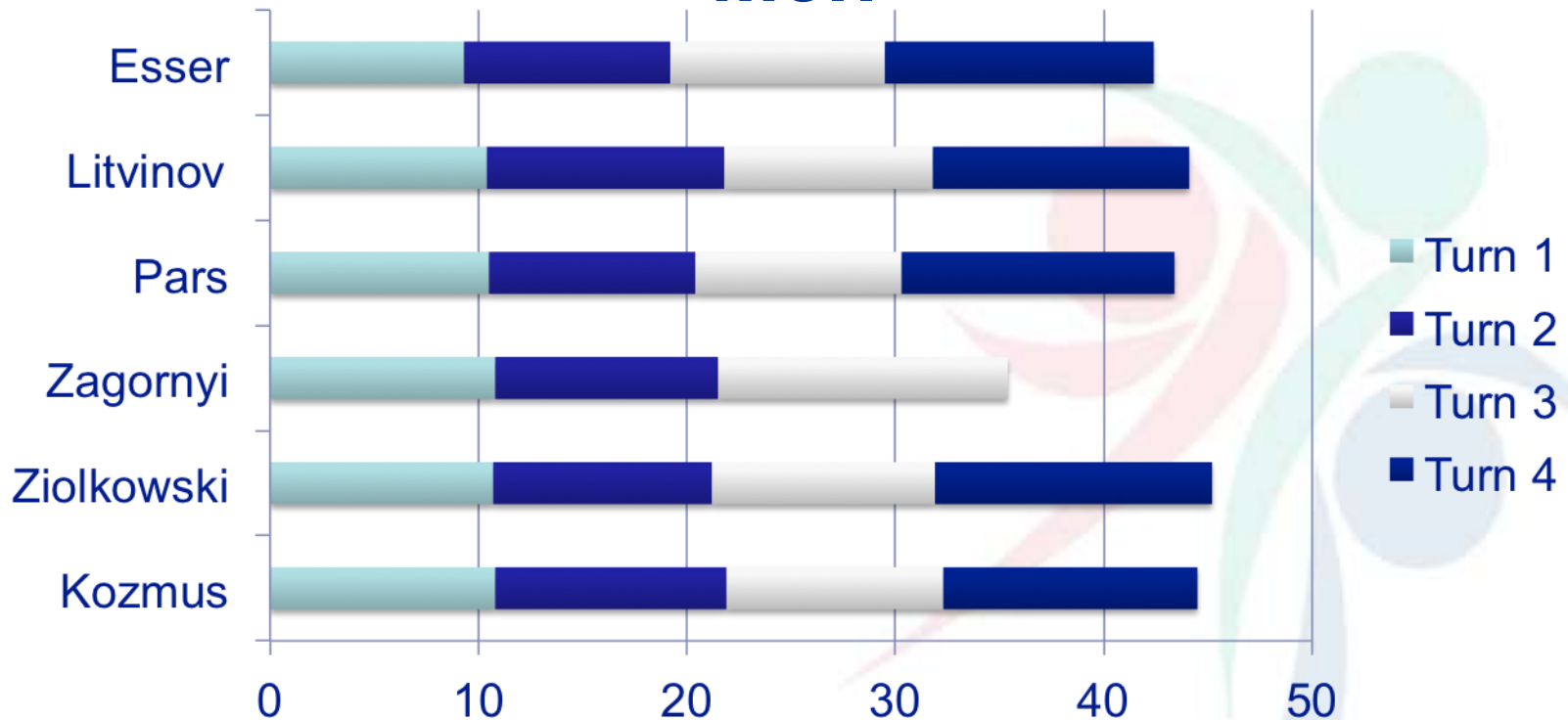


## Hammer Radius Changes During the Throw

- Orbit will decrease slightly from first turn to last turn
- Radius increases from low point to release point during delivery

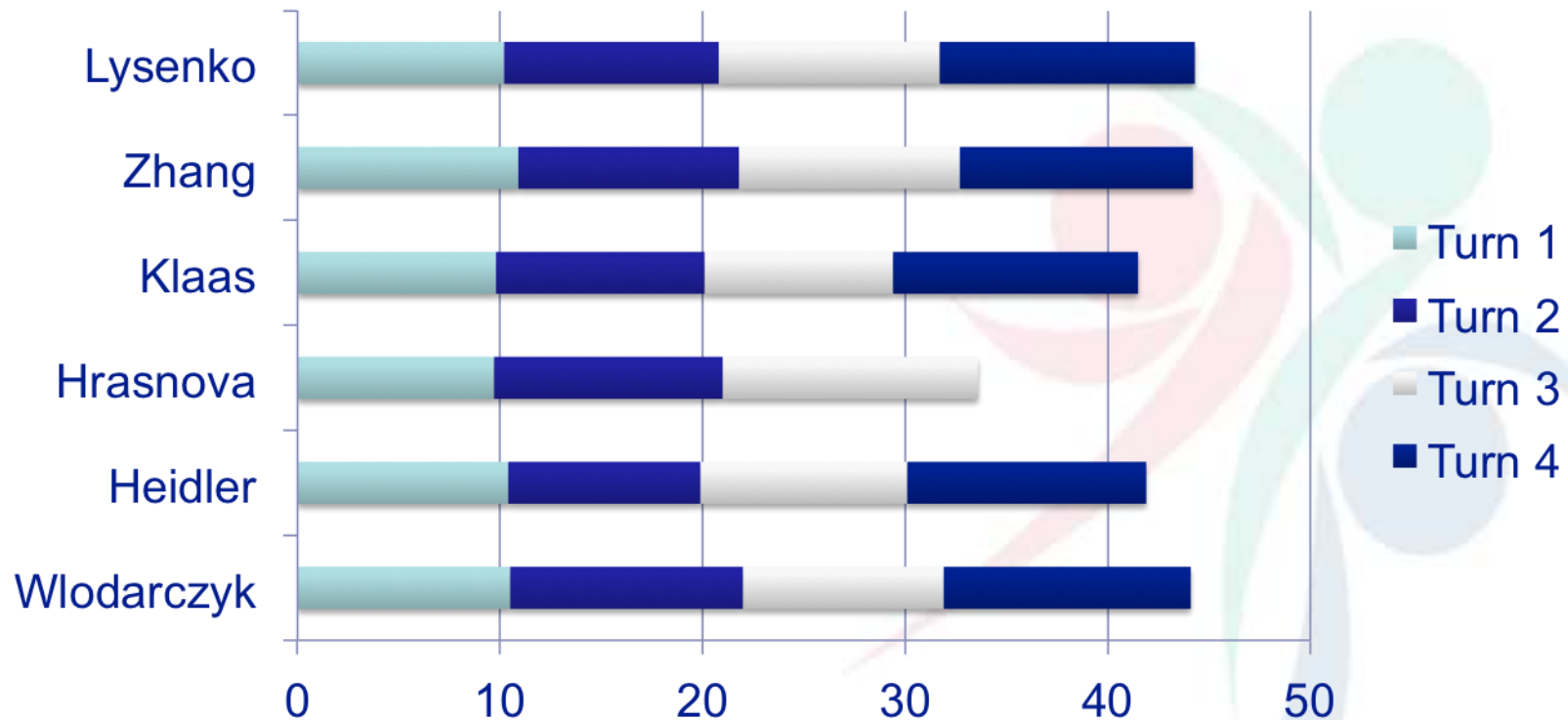


# Path of the Hammer During the Turns: Men



From: Isele & Nixdorf, Biomechanical Analysis of the Hammer Throw at the 2009 IAAF World Championships in Athletics

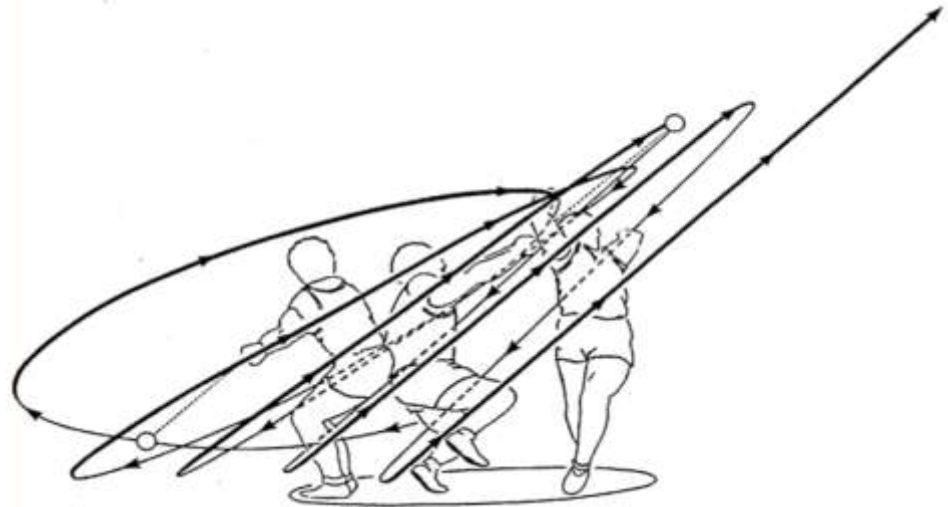
## Path of the Hammer During the Turns: Women



From: Isele & Nixdorf, Biomechanical Analysis of the Hammer Throw  
at the 2009 IAAF World Championships in Athletics

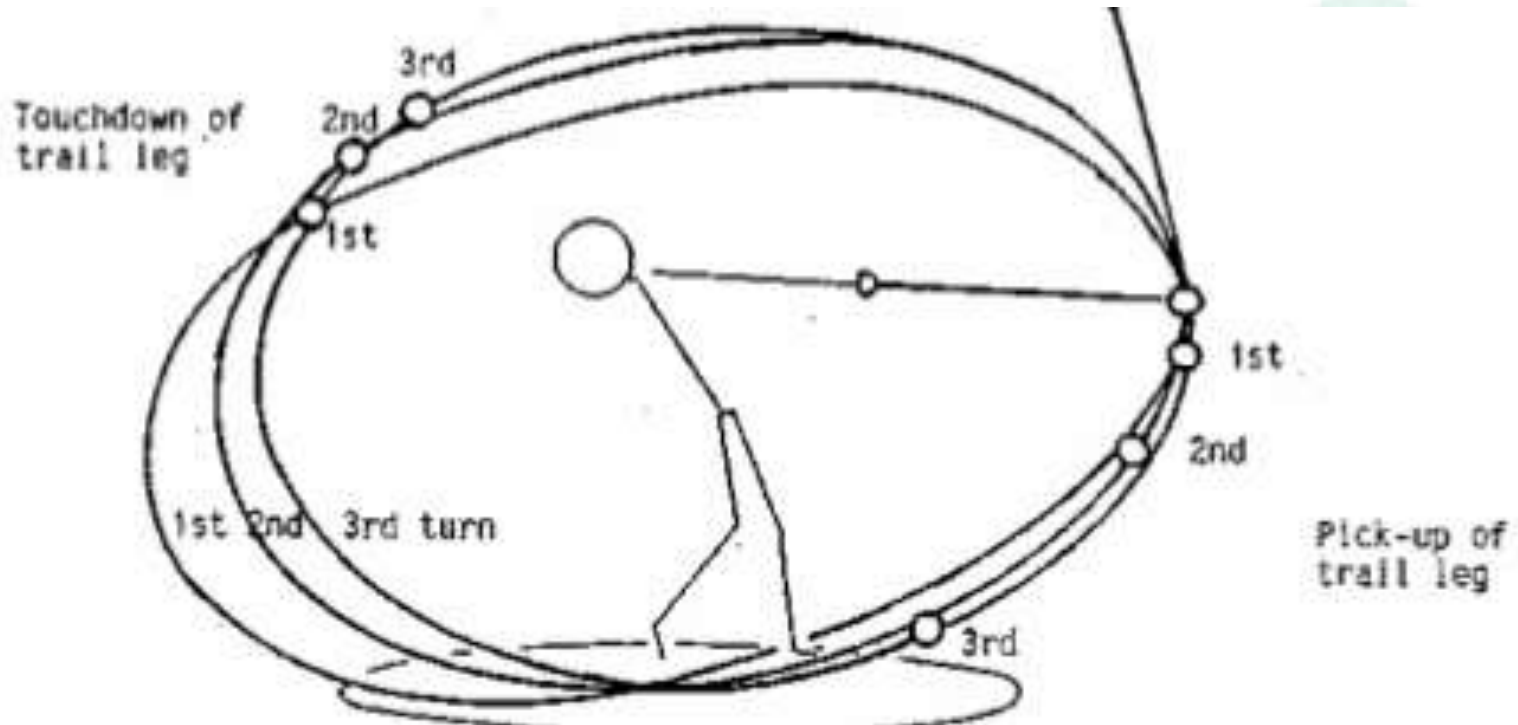
# Turning Mechanics and Orbital Path of the Hammer

- Steepness of the Orbital Path
- Three-turn vs Four-turn



From: Lothar Hinz

# Turning Mechanics and Orbital Path of the Hammer (con't)



From: Bartoneitz et al, 1987

# Turning Mechanics and Orbital Path of the Hammer (con't)

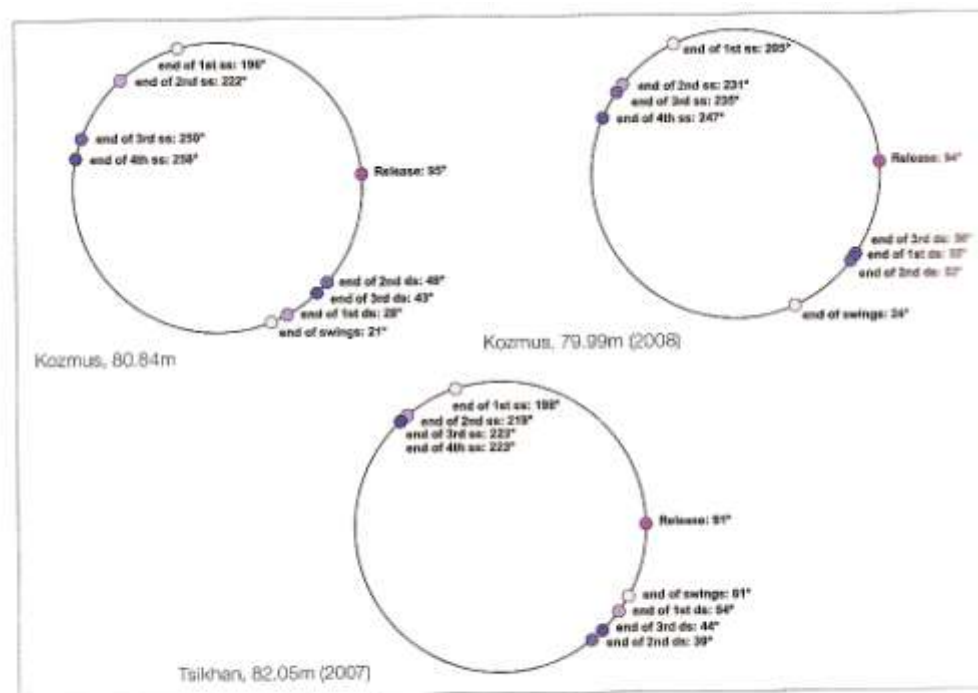


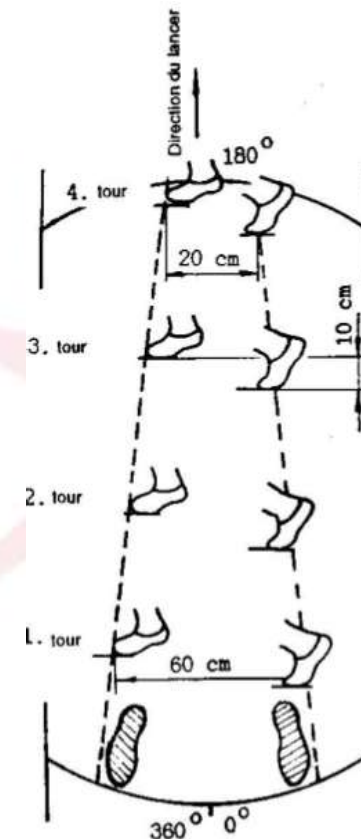
Figure 13: Azimuthal angle at the end of throw phases, displayed on a 360° circle for the winner of the men's hammer throw at the 2009 IAAF World Championships in Athletics and selected throws from earlier competitions

From: Isele & Nixdorf, Biomechanical Analysis of the Hammer Throw at the 2009 IAAF World Championships in Athletics

# Turning Mechanics and Orbital Path of the Hammer (con't)

## Footwork Mechanics

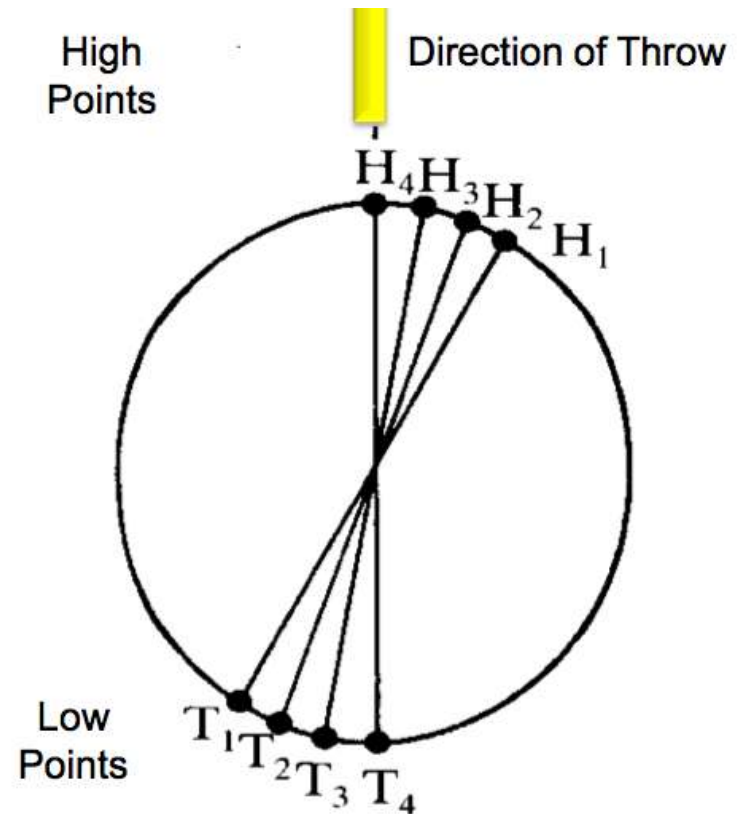
- Base of Support
- Gets narrower with each turn as the athlete turns faster



From: Lothar Hinz

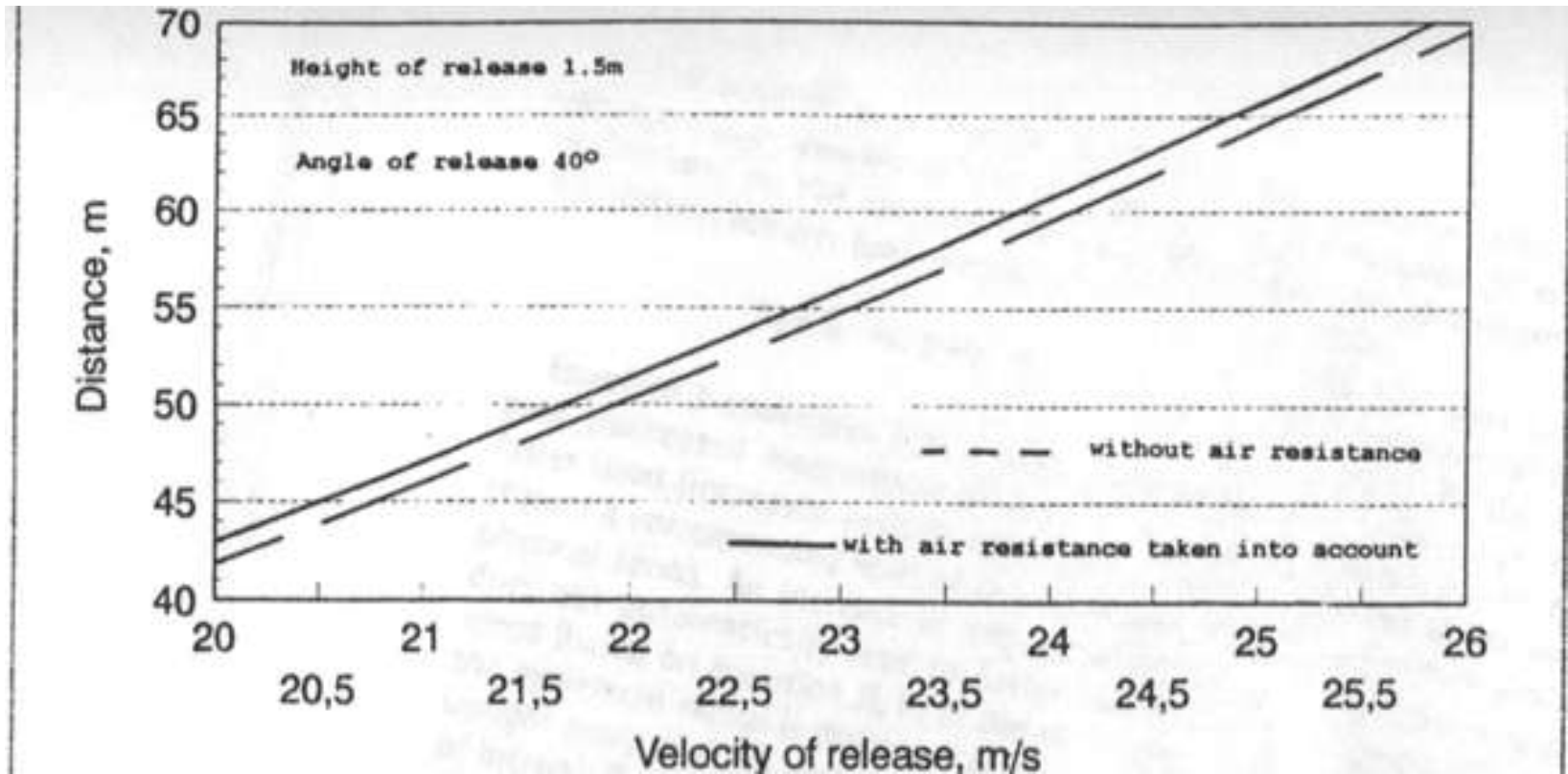
# High and Low Point Dynamics

- Low Point
  - Will move to the left with each turn
  - The low point will “drift” more if the thrower moves toward the hammer as it goes through low point
  - High point is always 180 degrees from low point



From: Leichtathletik 3 Werfen

## Release Speed and Release Angle for Hammer



From: Bartoneitz, Barclay, & Gathercole, 1997