

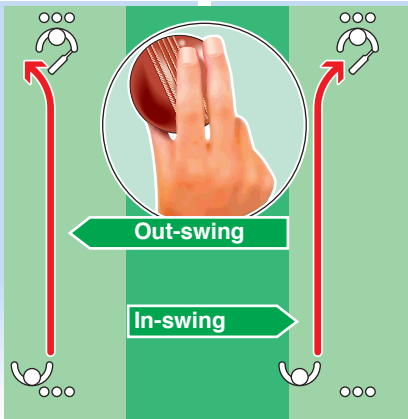
# How ball-tampering favours bowlers

By keeping one side of a cricket ball shiny and smooth, bowlers can swing the ball in the air. After 60-70 overs the surface of the ball becomes unevenly battered, and reverse swing becomes possible

## Normal swing

Ball held with shiny side towards batsman, seam points in direction ball will swing

## Normal out-swing



## Out-swinger

Seam points to **slip** (batsman's right)

## In-swinger

Seam points towards **fine leg** (batsman's left)

## Reverse in-swing



Rough side

Smooth side – air travels faster

Low pressure

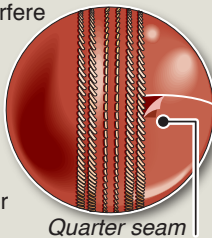
- 1. Boundary layer:** Thin layer of air forms around surface of ball
- 2. Rough side:** Air flow is turbulent due to seam of ball – causing rapid fluctuations in pressure
- 3. Smooth side:** Higher air pressure swings ball in direction of seam

Rough side towards batsman

- 4. Boundary layer:** Turbulent air flow extends to both sides of ball
- 5. Smooth side:** Air speed slows – air pressure falls
- 6. Rough side:** Higher pressure causes effect of seam to be reversed, swinging ball towards batsman

**Law 41.3.2:** Offence to interfere with surface or seams, or alter condition of ball in any way

**Allowed:** Players can polish ball on their clothes, dry wet ball, or remove mud from ball under supervision of umpire



Quarter seam

**Tampering:** Sucked sweets, lip gloss, Vaseline or hair wax all used to make smooth side shine

Rubbing grit into quarter seam to make rough side rougher, gouging or use of sandpaper banned