Bowler Vision
Outline

- Importance of biomechanics to the sport of bowling
- Eye tracking background
- How bowler vision works
- Points of interest
- Trends in skill levels
- Examples
Biomechanics & Bowling

- Importance
  - Scientific support data

- Foot Pressure
  - Timing mechanism

- Kinematic Sequencing
  - Velocities of body segments
Kinematic Sequencing

KS Graphs
Eye Tracking Background

- Vision-in-Action Paradigm
  - Field of view is determined by the athlete
  - Orientation of the head and gaze are function of task and skill level of the athlete
  - Athlete acquires information in all three dimensions
Eye Tracking Background

- Ice Hockey Goaltending
- Basketball Shooting
- Baseball Hitting
- Pistol Shooting
- Badminton
- Golf Putting
Eye Tracking Background
Bowler Vision

- Light weight optics
- Recording device located on a waist pack
- Eye image and scene image are interlaced
- Data is saved to DVCR tape – DVCR is battery operated
- Sample rate of 30 frames per second
Bowler Vision

- Glasses
- Eye Camera
- Scene Camera
- Monocle
Bowler Vision

- 3 near infra-red LEDs
- Reflected by the cornea
  - Appears as a triangular pattern of 3 dots
- Pupil moves relative to the head
- Corneal Reflection approximately same position
Bowler Vision

- Scene Image Calibration
What we’re looking for

- Trends
  - Shot to shot repeatability
  - What bowlers of different skill levels look at
  - Balance related to targeting issues
  - Lane visualization
    - Side to Side
    - Back to Front
Trends in skill levels

- Beginner
Trends in skill levels

- Beginner
Trends in skill levels

- Intermediate
Trends in skill levels

☐ Advanced
Trends in skill levels

- Advanced
Trends in skill levels

- Elite
Trends in skill levels

- Elite
Trends in skill levels

☐ Elite
Final Thoughts

- Insight into athlete’s individual targeting system
- Understanding of how stable the head is
- Where and when ball motion is observed by the athlete
- Lane visualization
Thank You!
Questions?