

Presented by: Bryan O'Keefe & Nicki Mours

June 29, 2010

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

ImportanceScientific support data

Foot PressureTiming mechanism

Kinematic SequencingVelocities 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





- 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





Glasses
Eye Camera
Scene Camera
Monocle



- □ 3 near infa-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







□ 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



□ Beginner





□ Beginner





□ Intermediate





□ Advanced





□ Advanced





Elite





Elite





□ 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?

