



Video Analysis and Application in Sport

KIN 856 – Physical Bases of Coaching

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Why use video?




- Video archives
- Gain insight into performance
 - See “new” things
- Directly impact athletes
 - Feedback/ Motor learning
 - Technique
- Linked into the “critical questions” you want to answer

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Goals of this presentation...

- General Principles
- Overview - ways to use video in sport
 - Basic to complex
- Equipment & technology
- Pros/ cons
- Video examples



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General Videography Principles

- Know what you want before you film
 - What do you want to do with it later?
 - What angle should you use?
 - What equipment will you need?
 - Know capabilities of your “system”
 - What format do you need?
- Maintain consistency
- Lighting and camera settings

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Qualitative vs. Quantitative

- **Qualitative** – analysis related to the quality of the athletic performance.
- **Quantitative** – analysis related to the “quantities” associated with an athletic performance

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BUT, Don't have preconceived expectations...

- “Inattentional Blindness” – if you’re looking so hard to find something, you will often overlook what is actually there.
- Depending on how you use video, you will have the opportunity to see things that you otherwise might not with the naked eye.

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Qualitative: Basic I

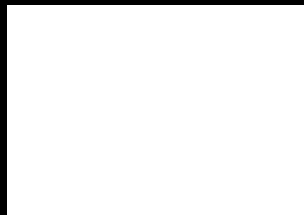
- “Available” video
- NEEDS
 - Media
 - Recorder/ Player
- PROS
 - Inexpensive
 - Fast and “easy”
- CONS
 - Right view?
 - Right athlete?



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Qualitative: Basic II

- Record your own video
- NEEDS
 - Camera, media, player
- PROS
 - Relatively inexpensive
 - Fast
 - Focus on what you want
- CONS
 - Limited views?
 - Consistency
 - Logistics (e.g. power)



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Sliding Sports: Technical Eval.

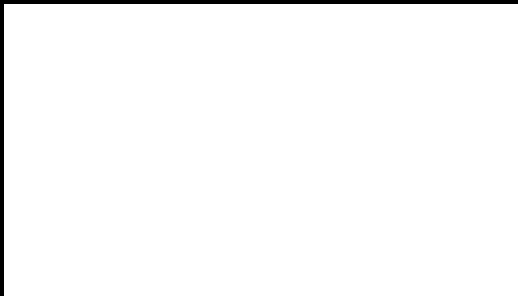


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QUESTION 1:
How do we best prepare
for the track in
Vancouver?

QUESTION 2:
Can we improve our
'driving technique'?

Bobsled/ Skeleton: Turn by Turn Analysis



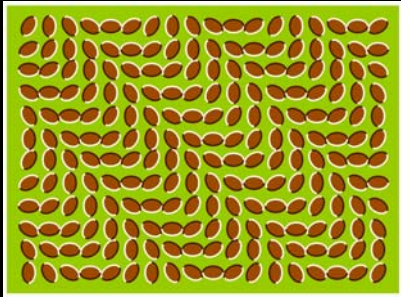
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Point of View Video



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Can you trust your eyes?



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Qualitative: Computer-Based Analysis

- Many programs that allow you to play (e.g. Windows Media Player) or "manipulate" video (e.g. Dartfish)
- Exercises:
 - Direct import into Dartfish
 - Frame-by-frame analysis
 - Side by side athlete comparison
 - Simulcam function
 - Stro-motion function
- Audio commentary
- Key Frames/ Positions
- Limited quantitative analysis

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Video Comparison



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Thoughts on Computers

- Processor Speed
 - Minimum 3.0 GHz, but do your homework
- RAM
 - Minimum: 512 Mb
- Video Card
 - 128-256Mb of memory
- Ports
 - IEEE 1394/ Firewire ports
- Hard Drive
 - As much as you can afford
 - Also removable storage options



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Notes on File Types

- CODEC: Compression/ Decompression algorithm
- DV: Digital Video
 - Uncompressed, high quality (1Gb/ 5 min)
- AVI: Audio-Video Interleaved
 - DV-AVI: full quality video
- MPEG: Moving Picture Experts Group
 - MPEG2: various levels of compression
 - MPEG4: hard drive cameras, streaming
- WMV: Windows Media Video
 - Various levels of compression
- Quicktime: Apple/ Windows
 - .MOV Extension

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Choosing the Right Camera

- What Media?
 - Mini-DV Tape
 - Mini-DVD
 - Hard Drive
- Definition
 - Standard Definition (SD)
 - High Definition (HD)
- Shutter Speed
 - 1/1000 or greater



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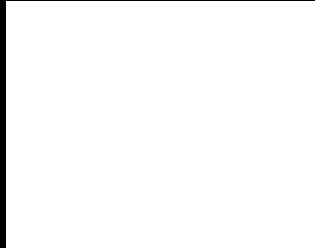
Qualitative: High Speed Video

- Added level of detail
 - Performance analysis
 - Injury evaluation
 - Equipment performance
- PROS
 - Great detail
 - Pretty cool
- CONS
 - Cost
 - Equipment
 - Utility?



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Casio EX-F1 High Speed Camera



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Bobsled/ Skeleton: High Speed Video



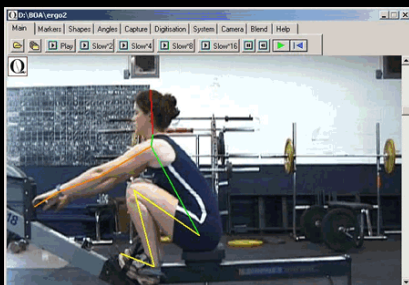
“Quasi-Quantitative:” 2D Analysis

- Putting numbers to data
- **NEEDS**
 - Computer/ software
 - Camera
- **PROS**
 - Numbers
 - Moderate turn-around
- **CONS**
 - 2D analysis
 - Confined to lab?
 - Time to analyze
 - Added costs/ expertise



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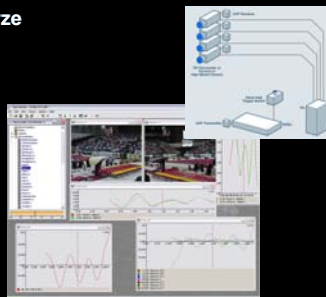
Quantitative: 2D Analysis



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Quantitative: 3D Analysis

- Reconstruct and analyze 3D movements
- **NEEDS**
 - Multiple cameras
 - Specialized software
- **PROS**
 - Data, data, data.
 - New insights
- **CONS**
 - Costs (time and \$\$)
 - Time consuming
 - Constrained to lab?
 - “General” information



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Quantitative: 3D Analysis



Quantitative: Video Overlay

- **NEEDS**
 - Video acquisition
 - Sensors
 - Computer/ software
- **PROS**
 - Real-time feedback
 - Actual data/ numbers
 - Specific questions
- **CONS**
 - Software development
 - Expertise
 - Costs



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Swimming: Technique Analysis



QUESTION:

What is the relationship between technique and propulsion in the water?

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Swimming video overlay system



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Boxing: Punch Analysis



QUESTION:
How can the US boxers
deliver more effective blows
to their opponents?

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Boxing: Punch analysis video overlay



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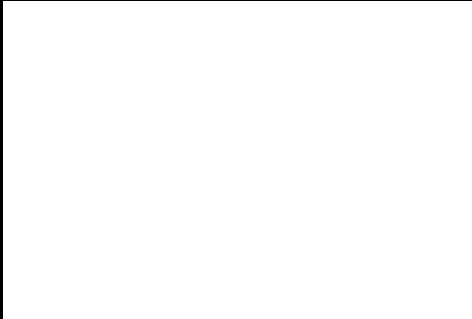
Weightlifting: Technique Analysis



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QUESTION:
How can we promote symmetry to enhance performance/ reduce injury risk?

Weightlifting: Lift Performance



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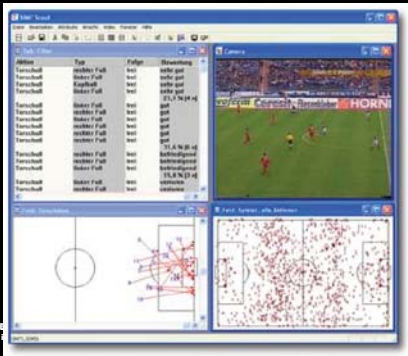
Scouting/ Performance Database

- Evaluation of “future competition”
- Establish database of competitors, situations and/or events
- Tagging
 - Dartfish
 - XoS
- Examples:
 - Soccer
 - Softball



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Team Sports: Match (notational) Analysis



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Immediate Video Feedback



QUESTION:
How can we provide real-time feedback of performance during training?

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Eye on Performance System



Video Sharing/ Evaluation

- Education efforts
- Communication
 - Long distance
 - Coach to athlete
 - Athlete to coach
- CD, DVD, iPod, websites...
- Evolution of Eye on Performance



www.playerdevelopment.usta.com

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DartfishTV



- Upload video content
- Tagged video
- Password protection
- Media books/ education
- Meet your specific needs

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The End

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