Real-world challenges in the pursuit of Olympic excellence

Peter Vint, Ph.D.

United States Olympic Committee
Performance Services Division
United States Olympic Committee

To support United States Olympic and Paralympic athletes in achieving sustained competitive excellence and preserve the Olympic ideals, and thereby...

inspire all Americans.
Some things on our mind…

USA vs CHN - Top 8 Scores + Predicted (95% CI) Recent

CHN will overtake

Time

USA Ranked 65/79
R(79)=.75 (p<.001)
Issues we face

**Macro level:**
- Resource allocation (time, money, effort…ROI)
- Athlete and performance “trajectories”
- Talent ID and athlete retention
- Competition strategy and analysis

**Micro level:**
- Factor relationship to performance
- Factor sensitivity to training & “status”
- Factor interaction and interdisciplinary issues
Resource allocation

- How do we best allocate financial and personnel resources among our NGB’s?
  - Team vs individual sports
  - Disciplines within an NGB
  - Medal vs “inspirational” impact

- Can we optimize team selection and training processes to maximize results?
  - Gymnastics
  - Decathlon
  - Modern pentathlon
Performance trajectories

- Human limits?
- Differences in:
  - drug testing?
  - training?
  - competition?
Xiang Liu vs Terence Trammell

110 m Men’s Hurdle
Match (notational) analysis

- Physiological workload and implications
  - Training
  - Nutrition
- Match strategies
- Situational probabilities
- Coverage tactics (set covering deployment)
Deterministic model of vertical jumping

- Takeoff Height
  - Physique
  - Body position at takeoff
- Flight Height
  - Vertical velocity at takeoff
- Reach Height
  - Physique
  - Body position at touch
- Loss Height
  - Mistiming
  - Gravity
  - Air resistance

- Jump and Reach Height
  - 8’5” ft = 100” = 100%

- Initial vertical velocity
- Change in vertical velocity
- Forces exerted
  - Leg forces
  - Trunk forces
  - Arm forces
- Times forces act
- Mass
# Overall touch height

## Effects of jump type

<table>
<thead>
<tr>
<th></th>
<th>One-legged Jump</th>
<th>Two-legged Jump</th>
<th>Attack Jump</th>
<th>Attack Jump</th>
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<tbody>
<tr>
<td>Overall Height</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>8’10”</td>
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<tr>
<td>Takeoff Height</td>
<td>44%</td>
<td>40%</td>
<td>47%</td>
<td>4’2”</td>
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<tr>
<td>Flight Height</td>
<td>14%</td>
<td>18%</td>
<td>14%</td>
<td>1’3”</td>
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<tr>
<td>Reach Height</td>
<td>42%</td>
<td>42%</td>
<td>39%</td>
<td>3’5”</td>
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<tr>
<td>Loss Height</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>–0’.8”</td>
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## Physique and Sub-Height Correlations

<table>
<thead>
<tr>
<th></th>
<th>Mass</th>
<th>Standing</th>
<th>Takeoff</th>
<th>Flight</th>
<th>Reach</th>
<th>Contact</th>
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<tbody>
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<td>Mass</td>
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<td></td>
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<tr>
<td>Standing</td>
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<td>-.04</td>
<td>.04</td>
<td>.29</td>
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</tbody>
</table>
Establishing relative importance of factors to official measured distance in long jump performance

Establishing relationship between judges score and mechanical factors related to performance
Thank you

peter.vint@usoc.org
www.usolympicteam.com