Strength Training for Throwers

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SOMEONE MIGHT THINK:
BUILD “EXPLOSIVE” POWER!
BUT IT IS NOT ENOUGH!!

Drawing reprinted from Blachon
WHAT are the physical phases and load requirements of strength development for throwers?
Conditioning – Developing the Maximal Force

Adapted from J-P EGGER
Temporal & Spatial Structures of Technical Movements
- Dynamics
- Muscular Strength
- Coordination
- Motor Programme
- Proprioception
- Reflexive Modulations
- Mental Adjustment
- Athletic Form or Condition
The stretch reflex is involved in the knee jerk reflex. A tap on the patellar tendon (1) stretches the extensor muscle (EM) (2) and its muscle spindle MS. The MS discharges, exciting the associated sensory fibres (3) that excite the motor neurons to the EM (4). Contraction of EM (5) leads to extension of the lower leg (6) (knee jerk). For proper execution of the knee jerk reflex, flexor muscles must relax. To do this, branches of sensory fibres from MS activate inhibitory interneurons (7), which, in turn, inhibit the motor neurons to the flexor muscle (8).
Electromyographic (EMG) responses to stretch of the biceps muscle and change in arm position when a load is suddenly applied.
Types of Compensations

**M1 Response** – The monosynaptic stretch reflex, with a latency of 30ms to 50ms.

**M2 Response** – The polysynaptic, functional stretch reflex, with a latency of 50ms to 80ms.

**Triggered Reaction** – The reaction to perturbations, with a latency of 80ms to 120ms; it is flexible, yet faster than the M3 response.

**M3 Response** – The voluntary reaction-time response, with a latency of 120ms to 180ms.
## Characteristics of Different Classes of Muscular Responses to Perturbations during Movement

<table>
<thead>
<tr>
<th>Response Type</th>
<th>Latency (ms)</th>
<th>Flexibility &amp; Adaptability</th>
<th>Role of Instructions</th>
<th>Effect of Number of Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1 Response</td>
<td>30-50</td>
<td>Almost None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>M2 Response</td>
<td>50-80</td>
<td>Low</td>
<td>Some</td>
<td>None(?)</td>
</tr>
<tr>
<td>Triggered Reaction</td>
<td>80-120</td>
<td>Moderate</td>
<td>Large</td>
<td>Moderate</td>
</tr>
<tr>
<td>Reaction-Time Response</td>
<td>120-180</td>
<td>Very High</td>
<td>Very Large</td>
<td>Large</td>
</tr>
</tbody>
</table>
Specific Strength of Throwers
Incorporates the Following
Technical Features:

<table>
<thead>
<tr>
<th>Hereditary Abilities</th>
<th>Developed Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Speed</td>
<td>Force</td>
</tr>
<tr>
<td>Timing</td>
<td>Sequence</td>
</tr>
<tr>
<td>Rhythm</td>
<td>Amplitude</td>
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<tr>
<td>Balance</td>
<td>Direction</td>
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<tr>
<td>Proprioception</td>
<td>Path</td>
</tr>
<tr>
<td>Reflexive Modulations</td>
<td>Angle</td>
</tr>
<tr>
<td>Ambient Vision - Quick</td>
<td>Position</td>
</tr>
<tr>
<td></td>
<td>Focal Vision - Slow</td>
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</tbody>
</table>
Three Levels of Throwers’ Specific Strength Development

Specific Throwing Strength
Explosive Strength, Speed Strength, Reflexive Strength
(Implement Released)

Specific Skillful Strength
Maximum Power, Explosive Strength, Proprioceptive Strength
(Implement not Released)

Specific Fundamental Strength
Maximum Power, Maximum Strength, Balance Strength
(Extensive Exercises of Various Forms)
Specific Fundamental Strength - To Develop Maximum Power, Maximum Strength, Balance Strength of Major Body Segments

Exercises including snatch, power clean, clean and jerk, bench press, squats, trunk rotations, depth jumps, stand long jump, stand triple jump, bounding, core stabilizations, etc.
Conditioning – Developing the Maximal Force
Specific Skillful Strength-To Develop Maximum Power, Explosive Strength, Proprioceptive Strength (Implement not Released)
Exercises including specific strength machine drills, Bundachuks, one arm and double arm flies, release movement imitations with or without implements, quick successive rotations, etc.
Conditioning – Developing the Maximal Force
Conditioning – Developing the Maximal Force
Specific Throwing Strength- To Develop Explosive Strength, Speed Strength, Reflexive Strength (Implement Released)

Exercises including kettle bell put or throw, overhead shot throwing forward and backward, rotational medicine ball put, sling bar bell plate, heavy and light implements throw, rubber ball throw toward net or wall, etc..
Conditioning – Developing the Maximal Force
Classifications of Specific Strength Training Methods

- Specific Temporal Reinforcement
- Specific Spatial Reinforcement
- Specific Spatial-Temporal Combination
- Specific Effect Transferring Combination
Specific Temporal Reinforcement

The objective is to induce throwers’ Hereditary Abilities to meet specific technical demands.

- Drills designed according to the specific events’ deep-structured variables, such as, Speed, Timing, Rhythm, Balance, Proprioception, Reflexive Modulations and Ambient Vision, etc..

- These exercises always take the priority in development of throwers’ specific strength, especially in their early stages.
Specific Spatial Reinforcement

- The objective is to fortify throwers’ Developed Capabilities to meet the specific technical demands.
- Drills designed according to the specific events’ superficial parameters, such as Force, Sequence, Amplitude, Direction, Path, Angle, Position and Focal Vision, etc..
- These exercises should be of the fundamental part in development of throwers’ specific strength.
Conditioning – Developing the Maximal Force
Specific Spatial-Temporal Combination

- The objective is to combine throwers’ Hereditary Abilities and Developed Capabilities together, to foster “motor sense and schema” to meet the specific technical demands.

- Drills designed according to the specific events’ movement, such as throwing implements with different intensities, distances, shapes and weights, etc..

- These capabilities are extremely important for top-level throwers.
Conditioning – Developing the Maximal Force
Conditioning – Developing the Maximal Force
Specific Effect-Transferring Combination

- The objective is to obtain optimum synergetic effect from well-ordered exercises based on training principles, to meet the specific technical demands.

- Drill combinations designed according to the specific events’ dynamics, such as:
  
  - Maximum Strength → Power → Explosiveness
  - General → Special → Specific
  - Technical Positive Transferring Combinations

- These exercise combinations should be of the main contents in development of throwers’ specific strength.
It is a kind of contrast training method, making use of optimum psychological arousal, maximum neuromuscular coupling effect and maximum number of activated motor units e.g.,

- Squat with heavy load
- Lunges or stepping upon stairs with light barbell on shoulders
- Standard or light implement throwing or putting
General → Special → Specific

- Converting all the human abilities and capabilities into events’ specific demands, increasing difficulties in movement control e.g.,

  - Bench press
  - Jerks with light load
  - Standard or light implement throwing or putting
Technical Positive Transferring Combinations

Specific strength exercises conducted in order to induce positive transfer of sequential technical movements e.g.,

- Simulator Practice
- Fractionization
- Simplification
- Segmentation
- Parted → Transitional → Whole