

ANALYSIS OF STARTING & SPRINTING

by
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LIMITATIONS

1. **SOMATOTYPE (BODY BUILD)**
 - SHORT SPRINT (SHORTER/MUSCULAR)
 - LONG SPRINT (TALLER/LESS BULKY)
2. **STRENGTH**
 - STATIC STRENGTH - BODY SEGMENTS ARE STABLE OR MOVING AT LOW RATE OF FLEXION/EXTENSION (WEIGHTS)
 - DYNAMIC STRENGTH - BODY SEGMENTS ARE MOVING AT HIGH VELOCITIES (SPRINTS/PLYOMETRICS)
 - POWER/BODY WEIGHT RATIO
3. **ENDURANCE**
 - STRENGTH AND PHYSIOLOGICAL ENDURANCE
 - MORE CRITICAL FOR LONG SPRINTS
4. **CONDITIONING**
 - FITNESS
 - SPECIFICITY
5. **MENTAL**
 - DEDICATION (EFFORT/TIME), DISCIPLINE, GOALS, INJURY/ILLNESS, PEAKING, FOCUS (TRAINING & COMPETITION)
6. **MECHANICS**
 - ABILITY TO PLACE BODY SEGMENTS IN REQUIRED POSITIONS DURING PERFORMANCE
 - PHYSICAL MAKEUP (ANTHROPOMETRIC, STRENGTH, FLEXIBILITY)
 - MOTOR PATTERNS

FACTORS AFFECTING SPRINT PERFORMANCE:

1. REACTION TIME
2. BLOCK CLEARANCE
3. ACCELERATION
4. SPEED MAINTENANCE
5. DECELERATION

START

OBJECTIVE: A QUICK RESPONSE WHICH POSITIONS THE ATHLETE FOR EFFECTIVE ACCELERATION AND EFFICIENTLY ATTAINS PROPER RUNNING POSTURE.

AMPLIFY: NEVER HURRY OR FORCE MOVEMENTS. REMAIN RELAXED, POWERFUL AND COMPLETE

BLOCK PLACEMENT (SPACING)

- 2 FOOT LENGTHS, 3 FOOT LENGTHS
- DOMINANT LEG IN FRONT
- HURDLES

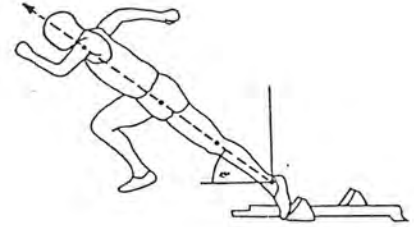
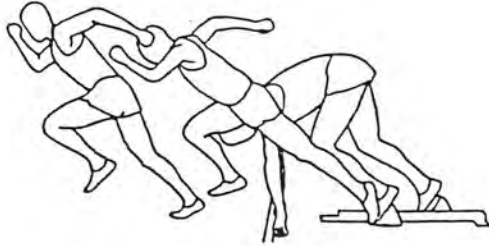
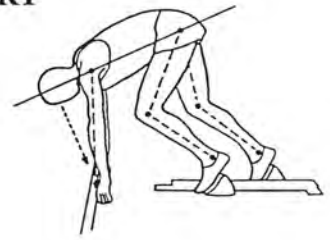
ON YOUR MARK...

- AVOID EXTRANEIOUS MOVEMENTS
- HAND PLACEMENT
 - *ON FINGERTIPS
 - *SLIGHTLY WIDER THAN SHOULDERS
 - *ARMS EXTENDED
- SHOULDERS OVER HANDS (LATERAL VIEW)
- NECK AND SHOULDERS RELAXED
- LINE OF SIGHT IS DOWNWARD



SET...

- SMOOTHLY AND CONTINUOUSLY ELEVATE THE HIPS TO A POSITION HIGHER THAN THE SHOULDERS
- SHOULDERS REMAIN DIRECTLY OVER THE HANDS OR OVER THE START LINE - NOT BEYOND.
- ANGLES
 - *FRONT LEG 90° - 100°
 - *BACK LEG APPROXIMATELY 135°
- NECK AND SHOULDERS ARE RELAXED WITH HEAD NATURALLY ALIGNED WITH TRUNK
- LINE OF SIGHT
- FOOT PRESSURE ON BOTH BLOCKS



GUN...

- RUN OUT OF THE BLOCKS
- SPANK BACK LEG OR DOUBLE LEG THRUST
 - *IMMEDIATELY FOLLOWED BY FRONT LEG AND HIP EXTENSION COUPLED WITH BACK LEG AND HIP FLEXION
- AT COMPLETION OF FRONT BLOCK EXTENSION:
 - *HIPS SETTLE SLIGHTLY AND SHOULDERS RISE TO PRODUCE A STRAIGHT BODY ALIGNMENT ANGLED AT APPROXIMATELY 45°
 - *HEAD IS STILL ALLIGNED WITH TRUNK
- DISPLACEMENT IS AT THE ANKLE - NOT TRUNK OR WAIST
 - *BENDING FORWARD LIMITS HIP FLEXION, SHORTENS STRIDE LENGTH, AND MISDIRECTS FORCE CAUSING UNDESIRABLE ROTATION

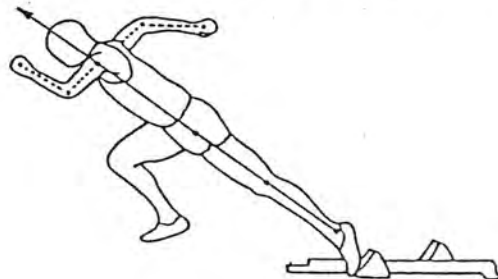
FOOT PLACEMENT

- BENEATH HIP SO LEG IS PERPENDICULAR TO TRACK (FRONTAL VIEW)
- INITIAL ACCELERATION MAY BE VIEWED AS A SERIES OF PUSHES
- ACTIVE (DOWN AND BACK)
- DORSIFLEX
- DON'T OVER-EXTEND OR PULL



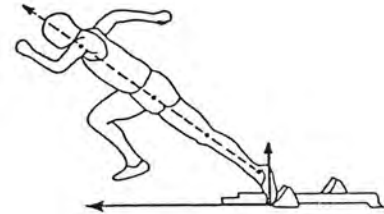
ARM MOVEMENTS

- COORDINATED WITH LOWER BODY REACTION TO AMPLIFY FORCE AND MAINTAIN BALANCE
- ARM OPPOSING REAR LEG FLEXION THRUSTS FORWARD/UPWARD (ANGLES $90^{\circ}/90^{\circ}$)
- ARM OPPOSING FRONT LEG EXTENSION THRUSTS BACKWARD/UPWARD (MORE OPEN AT ELBOW, UPPER ARM PERPENDICULAR)
- MAXIMIZE EFFICIENCY AND POWER BY SYNCHRONIZING ARMS AND LEGS IN RANGE AND FORCE



SPRINTING

OBJECTIVE: TO COVER THE REQUIRED DISTANCE IN THE SHORTEST TIME



- STRIDE LENGTH AND STRIDE FREQUENCY (RATE)
 - *STRIDE RATE IS MORE CRITICAL
- DURING INITIAL ACCELERATION, FIRST 20 METERS OR SO, PRODUCTION OF HORIZONTAL GROUND FORCE IS CRITICAL
- TO CHANGE VELOCITY, FORCE MUST BE APPLIED IN THE DIRECTION IN WHICH THE VELOCITY IS TO BE ALTERED:
 - *AT THE START, LARGE AMOUNTS OF HORIZONTAL FORCE ARE REQUIRED TO CHANGE VELOCITY FROM "0" TO AS HIGH AS POSSIBLE
 - *AS MAXIMUM SPEED IS APPROACHED, CHANGE IN VELOCITY APPROACHES "0" AND REQUIRED HORIZONTAL FORCE APPROACHES "0"
- FOR MOST SPRINTERS, 95% OF MAX SPEED IS REACHED BETWEEN 20 AND 25 METERS
- AS MAXIMUM HORIZONTAL VELOCITY IS APPROACHED, MECHANICS GOALS SHIFT FROM HORIZONTAL TO VERTICAL
- VERTICAL FORCE IS STILL REQUIRED EVEN THOUGH HORIZONTAL FORCE HAS DIMINISHED
- MAXIMUM HORIZONTAL VELOCITY IS DEPENDENT UPON THE AMOUNT OF EFFECTIVE VERTICAL FORCE APPLIED DURING GROUND CONTACT. (APPROXIMATELY .09 SEC)
- AT MAXIMUM SPEED VERTICAL FORCE MAY SURPASS 2 1/2 TIMES BODY WEIGHT AND EXCEED HORIZONTAL FORCE BY A 10:1 RATIO



MECHANICAL FACTORS

1. ARM ACTION (BALANCE)
 - * ELBOW 60° (MIN) FRONT/BACK 140° MID POINT
 - * UPPER ARM 80° (BACK) 50° (FRONT)
2. ACTIVE FOOT PLACEMENT:
 - CONTACT WILL OCCUR SLIGHTLY IN FRONT OF CENTER OF GRAVITY (8-9 INCHES)
 - *INCREASES STRIDE LENGTH
 - *GREATER RANGE OF MOTION TO PRODUCE NECESSARY VERTICAL SPEED
 - *TOO MUCH INCREASES GROUND TIME, SLOWS STRIDE RATE, AND INCREASES BREAKING FORCE
 - *TRADE-OFF
 - RECENT RESEARCH INDICATES THE BETTER SPRINTERS FAVOR MINIMIZING TOUCHDOWN DISTANCE AND GROUND TIME TO MAXIMIZE STRIDE RATE
 - SOME BRAKING WILL OCCUR AT TOUCHDOWN
 - BETTER SPRINTERS PRODUCE FOOT SPEEDS (NEGATIVE) THAT ARE CLOSE TO THEIR SPRINTING SPEED
 - RUN IN FRONT OF THE BODY (LEVERS)
 - *LEG EXTENSION (KNEE) INCOMPLETE FREQUENTLY 150° - 160°
 - *HIP FLEXION (HIGH KNEES) IS FORCEFUL AND COMPLETE
 - *DORSIFLEX FOOT - DO NOT POINT DOWN
 - FOOT PLACEMENT
3. POSTURE AND RELAXATION



THINK SHORT AT THE END OF A RUN

- BODY UNIT
- DON'T OVERSTRIDE
- MAINTAIN POSTURE AND TURNOVER

WORLD CLASS SPRINTERS MAINTAIN MAXIMUM VELOCITY TO 75 OR 85 METERS AND ONLY EXPERIENCE 2% - 3% DECELERATION TO THE FINISH OF A 100 METER SPRINT.

GIVEN THE OBJECTIVE TO ACCELERATE OVER THE LONGEST DISTANCES IN THE SHORTEST TIME, IT FOLLOWS THAT THE BETTER CONDITIONED ATHLETE WILL SLOW DOWN LESS AND EXPERIENCE MORE SUCCESS.

FINISH

- TO LEAN OR NOT TO LEAN

COACHING "TERMS"

STARTING

1. ELEVATE SMOOTHLY AND CONTINUOUSLY
2. SHOULDERS OVER HANDS
3. RELAX NECK
4. PRESSURE ON BOTH BLOCKS
5. DON'T GUESS THE GUN - REACT TO IT
6. CONCENTRATE ON "MOVEMENT"
7. SPANK AND PICK UP
8. RELAX AND AMPLIFY
9. ACTIVE FEET (DOWN AND BACK)
10. COME UP AND RUN
11. RUN OUT OF THE BLOCKS
12. BE QUICK BUT DON'T HURRY

SPRINTING

1. SWING FROM THE SHOULDER
2. THUMB INTO POCKET
3. OPEN THE ELBOW - (STROKE)
4. DON'T REACH
5. STEP DOWN
6. LIFT - DON'T PUSH
7. STAY TALL
8. RUN OVER YOUR TOES

DRILLS/TEACHING PROGRESSION

START

1. WOOD CLAPPER
2. ESTABLISH LEG DOMINANCE
 - LJ OR STANDING START
3. STANDING VERTICAL JUMP (STAGGER FEET)
 - HEAD/POSTURE
4. STANDING LONG JUMP (STAGGER FEET)
5. START MECHANICS WITH SUPPORT
 - STRAPS OR FENCE
6. DETERMINE BLOCK SPACING
 - 2 AND 3 FOOT LENGTHS TO BEGIN
 - ANGLES APPROX. 90 AND 135 DEGREES
7. REPEATEDLY COME TO SET POSITION
8. CLAP DRILLS (STANDING)
 - HAND TWITCH/COMPLETE
9. FULL STARTS (TAP/NO TAP)
 - TAPE ON TRACK (2 FOOT LENGTHS)
 - "HEEL PLACEMENT" ON 1ST STEP (DORSIFLEX)
10. SLED PULL/BELT

RUNNING MECHANICS

1. GIRLS
2. STANDING ARM SWING
3. RUN IN PLACE (POSTURE/DISPLACE)
4. SUB-MAX SPEED
 - ACCELERATE WITH TEMPO
5. TOUCH AND PICK UP (FRONT SIDE)
6. SPEED TRAP (LIMB SPEED)
7. OVERSPEED (ULTRA SPEED PACER)