NSA ROUND TABLE

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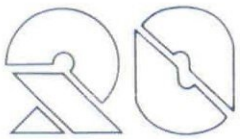

This edition of the Round Table examines the sprint hurdles. The multi-national panel consists of regular contributor Vern Gambetta (USA), Andy McInnis (CAN) Canadian National Hurdles Coach and Canadian Senior Event Group Coordinator for the Hurdles, Craig Hilliard (AUS), who is on the Track and Field staff at the Australian Institute of Sport in Canberra and is the Australian Track and Field Coaches Association's National Event Coach for Hurdles, Frank Hensel (GER), German National Coach for 110 metres Hurdles and Rüdiger Harksen (GER), German National Coach for 100 metres Hurdles.

1. Do you consider that the 100 and/or 110 metres Hurdle events could be improved by modifying their structure, e.g. by changing the regulations regarding height or distances between hurdles?

MCINNIS: The events could be 'improved' in the sense that we can modify the hurdle events to secure faster performance times. This is an obvious fact.

However, we must first ask ourselves if our single purpose in modifying the very nature and history of the event(s) should be to achieve faster times. I would strongly say *'no'* to a change of senior international standards, but *'yes'* to a modification of race standards to meet with the technical/speed evolution of younger athletes (15 - 20 year-olds) and to encourage participation in the event and a smoother transition into senior ranks.

Many countries have evolved an individual approach to 'youth' race standards. I would like to see to see a global uniformity in race standards and progression in the above mentioned age group(s) imposed by the IAAF.

The evolution of the women's sprint hurdles race from 80 metres to 100 metres after 1968 was an acceptance of the speed and agility of women and this was soon endorsed by the acceptance of women into other events. The addition of Women's Triple Jump to the 1993 World Championships timetable is the most recent example of this positive attitude.

If any potential change in the structure of the hurdles is to be entertained, I suggest it should be the raising of the women's 100 metres Hurdle height from 84 to 91cm. This would bring the race closer in line with the men's 110 metres Hurdles with regards vertical clearance requirements and technique.

HILLIARD: Yes, particularly with regards the women's 100 metres Hurdles. Because women athletes today are faster and more agile

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than in the past, the technical challenges of this event are no longer as demanding as they were when the event was conceived. These technical challenges seem particularly 'easy' when compared to those of the men's 110 metres Hurdles. I believe both the 100 and women's 400 metres Hurdle heights need to be raised. There is also a strong case for lowering the height of the hurdles in the men's Under 20 110 metres event. This would allow a better transition from junior to senior ranks and a longer period in which to develop a sound technical model.

GAMBETTA: Spacing between hurdles in the 110m Hurdles event could be increased to allow the hurdles to fit into the sprint stride pattern more easily. The height of the hurdles should remain the same but I would increase slightly the distance to the first hurdle. This exact distance, as well as the gap between following hurdles, could be accurately and scientifically determined using information gathered from high speed film analysis. This would take the guess-work out of determining hurdle placement. The net result should be that each hurdle stands slightly further apart which would reduce the distance of the run-in off the last hurdle.
The women's hurdles would benefit from an increase in height and an increase in the gap between hurdles. This would necessitate an increase in the total distance of the event to 110 metres.
The suggested changes would serve a dual purpose:
1) They would modify the events to bring them closer in line with the sprints
2) Since any drug assisted performances would obviously be erased from the record books, the sport would be able to start afresh with new records in new events.

HENSEL: I think the height of hurdles in the 100 metres event should be raised to 91.4cm. With regards the 110 metres event, changing the gap between hurdles would improve performance times at the top level but would cause problems for young athletes. I would prefer to leave the high hurdles as they are.

HARKSEN: I think there should be no changes at present.

2. Faced with a group of potential hurdlers, what would be the essential abilities (e.g. from joint mobility, strength, speed, coordination, perseverance, patience, enthusiasm, courage or any others you would like to consider) that you would look for – in order of priority?

MCINNIS: Anyone meeting the following recipe of ranked physical abilities could be a potential sprint hurdler:

- speed (start/acceleration ability);
- agility aptitude (neuro-physical coordination);
- in women, the right percentage of body fat or more importantly, the quality of lean body mass;
- psychological strength in competition/training;
- flexibility/joint mobility (to be enhanced and adapted);

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• height and other anthropometric considerations (which could be a limiting factor).

HILLIARD: In order of priority:
• speed;
• rhythm;
• coordination;
• power.
Leg length relative to height is also a key component. Athletes who are well coordinated are generally flexible and have good mobility but both these factors can be easily developed. To be relatively powerful is a bonus and strength gains and power levels can both be enhanced significantly over time through a variety of training regimes. Potential hurdlers must also possess a high level of kinesthesis – the ability to perceive body position, weight, muscle tension and movement.

GAMBETTA: In order of priority:
• speed;
• rhythm;
• coordination;
• height – leg length;
• mobility – hip and trunk.

HENSEL: When taking into account factors that will help determine performance, my view is that these will always depend on the individual.

HARKSEN: In order of priority:
• hurdle specific sprint ability (with the accent on cadence);
• technique and body stability;
• high level of maximal and explosive strength;
• aggressive running style and courageous attitude i.e. psychological ability;
• hurdles-specific endurance.

3. What progressive (learning) stages have you found to be most effective in teaching the high hurdle events?

MCINNIS: The progressive learning stages for hurdling should be as follows:

• to develop a sound technical sprint model (an ongoing process)
• to generate and preserve horizontal velocity when running to, over and off hurdles. This should be done using low barrier heights at first and later adapting 'standard' barrier heights as athletes demonstrate their competency. This is a lengthy process that can be disrupted by athletes taking part in 'standard' races too early. Coaching tip: be patient and choose the right races to meet athletes' level of development.

3. What progressive (learning) stages have you found to be most effective in teaching the high hurdle events?

• to encourage the development of hurdle rhythm. This can be achieved through drills and race rehearsal that encourage the enhancement of stride frequency with high velocity bi-motor disruption and re-education. This process is a multi-faceted blending of *barrier spacings and heights. Coaching tip: eliminate standard* height/spacing regulations when training hurdle rhythm.
• to implement technical strength and rhythm endurance exercises. This should take a 'back seat' to the first three critical stages of our model. The exercises will become more important as athletes physically mature. Remember, certain 'strength' qualities will emerge through repetition of intensive, technically correct training.

HILLIARD: Whole – part – whole. It is important for athletes to comprehend the whole technique from the beginning and embrace the skill components that need to be developed. Isolated trail and lead leg drills and rhythm can then be more easily learned. Most sessions should be conducted using a five-to-seven stride rhythm over lower hurdles to start with. Other combinations can then be included depending upon skill levels, for example, 5 strides with hurdles spaced 10.5 - 12.4 metres apart for women, and 11.4 - 13.3 metres apart for men.
The correct take-off movement pattern will also be encouraged by delayed trail leg drills, take-off drills over 84 - 92 centimetre high hurdles and jumps off 5-8 strides into a pit.

GAMBETTA: The 'Stick and Bricks' method is the most effective teaching method for individuals as well as groups. I have also found it helpful to teach the event on grass to alleviate any fear of falling on a hard track. Adjustable hurdles have recently appeared on the market that lower to 15cm and rise in 7 centimetre increments with a hurdle rail that is easily knocked off. These are very effective and inexpensive teaching tools and allow an easy progression in hurdle height as well as removing some of the fear factor because of their easily removable hurdle rail.
It is important to constantly stress throughout the learning stages that hurdling is sprinting. Hurdle heights should only be raised if the correct rhythm can be maintained. If rhythm is compromised, lower the hurdle! It is also important to adjust the heights and distances relative to the different stages of physical development as well as of age.

HENSEL: Using an appropriate training methodology procedure we have introduced the senior high hurdles to 16-18 year-old athletes with success during recent years.

HARKSEN: a) I believe it is preferable to consider the whole method first (holistic).
b) distances between hurdles should be chosen so as to preserve the sprint pattern.

c) fast clearance times of hurdles should be stressed.
d) a high centre of mass (CM) should be encouraged.

4. What methods would you recommend in order to improve stride frequency between the hurdles?

MCINNIS: There are as many recipes for 'rhythm' as there are coaches. All should embrace qualities that enhance 'over-speed' (horizontal velocity) in barrier clearance and 'over-frequency' in stride rate. Their function is to disrupt fixed motor patterns and re-educate the body's neuromuscular system with a faster pattern.
Coaching tip: Do it again, faster, faster. The coach must adapt the challenges of drills to allow for change in the athlete!

HILLIARD: I suggest including power, speed and coordination drills/units throughout the year.
- Move hurdles spacing closer together by 15 - 30cm;
- Men to hurdle women's hurdles and spacings;
- One step hurdling over 92cm barriers (5 - 10 reps) with 3-4.5 metres hurdle spacing depending on skill level;
- Increase the distance to the first hurdle by 5 metres;
- Hurdle with a tailwind;
- Athletes should do starts with faster athletes;
- Athletes should use mental imagery and accept feedback;
- Fast 3 and 5 stride hurdling should be combined to 'shock' the nervous system.
- Introduce numerous plyometric, bounding and contact drills that challenge the body's nervous system and the stretch-reflex complex of the relevant muscle groups.
- 6 metres Drill – Lines/rods/small barriers are placed 6 metres apart. Athletes use a 12 metres approach and run fast over 50 metres. The aim is to have two strides between each hurdle with the third stride touching down alongside the line/rod. The emphasis is on a fast stride rate within a restricted distance, similar to that experienced when hurdling.

GAMBETTA: I would recommend:
- East German stick drill. This consists of small wooden dowels placed on the track at progressively increasing distances to force a pattern of acceleration.
- Reduced spacing between hurdles. The reduction is usually about 30cm.
- Work over lower hurdles at heights of 99cm for men and 76cm for women.
- Running one step drills for lead leg, trail leg and over the top.
- Broken hurdles. This consists of three hurdles at normal spacing, one hurdle removed, and two more hurdles at normal spacing, or some variation of this theme.

HENSEL: The best way to do this is by shortening the distance between the hurdles.

HARKSEN: a) shorten the distance between hurdles;
b) sprint with shortened strides (mark track for guidance);
c) resistance sprints;
d) assistance sprints;
e) neuromuscular stride pattern training:
- with regards stride length,
- with regards stride frequency.

5. An analysis of hurdling technique in a recent copy of Track & Field Quarterly Review showed that a top class hurdler, during the last two strides before take-off for the fourth hurdle lowered his centre of gravity. How can you reconcile this with the injunction by coaches often heard to 'run tall'?

MCINNIS: Unfortunately, I did not see this article. However, I believe the coaches' tip should be changed from 'run tall' to: 'run tall/*forward*'. When too upright, a hurdler may find the supporting foot bearing weight ahead of the centre of gravity (CG). This could test knee joint integrity, create a collapse and encourage a lowering of the CG during the take-off support phase. A biomechanical study by Mann (USA) in the mid-eighties demonstrated that the best world class hurdlers had the ability to bring their take-off foot closest to a position directly under their CG at the initiation of support. This allowed a greater preservation of horizontal velocity and increased the rate of rotation of the CG into an enhanced horizontal line with take-off energies to be applied.

HILLIARD: The hurdle take-off is similar to that of the long jump, where there is a distinct change in the stride pattern over the last two strides where a 'setting' of the hips occurs. The push-pull effect of the legs and shortened last stride allows the foot strike of the take-off leg to be as active as possible and ensures the hips are moving upwards and forwards and the drive into the hurdle is maximised. Shorter hurdlers will tend to exhibit a more pronounced lowering of the CG than longer legged hurdlers. 'Running tall' is an important concept but certain actions occur within this framework that allows the hurdler to execute a proficient take-off where braking forces are kept to a minimum.

GAMBETTA: Without having seen the article and the study it is difficult to make specific comments. But before we jump to conclusions and attempt to generalise from one world class hurdler's performance some obvious questions need to be asked. How tall was the hurdler? Was this an isolated occurrence or did he do it consistently? How much does he lower his centre of gravity? How does he do this?

HENSEL: I don't see any contradiction in this. 'Running tall' (with high hips) according to the laws of biomechanis leads inevitably to this phenomenon.

HARKSEN: This statement is not surprising on the basis of biomechanical analysis known to me.