Identifying and developing junior elite athletes

by M. J. Holmes

High jumpers can come into the classification of "elite" rather early compared to athletes in other events. Another surprising factor is that most high jumpers come through to that stage without really intensive training behind them - in a couple of cases no real structured training at all.

The author therefore argues that the identification of junior elite high jumpers is not a factor, they just seem to pop up naturally. However, although there are not many late developers in high jump, young talents still have to be progressed from their heady start.

When considering the development of young high jumpers, coaches always have to have in mind the programme which they expect the individual will follow as an elite senior. This means that all training done at a young age must be for a purpose and be based on valid principles.

Bearing this in mind, the author deals with rules to coach by, components of success in high jumping, programming issues, and specific questions such as when to introduce strength training into the young high jumper's training.

Mike Holmes has been a member of the National Event Coaching Staff for UK Athletics since 1984, initially with responsibility for Shot Put in the GB Junior Team. He progressed to Combined Events and then to the Jumps with the GB Under 23 team, before taking on the responsibility for UK High Jump in 1994. Within athletics he is one of the most experienced Senior Coaches in the UK and he has been awarded a B.A.F. Master Coach award for his achievements in the sport. Mike Holmes has also worked for the IAAF in both Iceland and Zimbabwe. In his capacity as a personal coach he has been responsible for the development of Steve Smith, GB record holder indoors (2.38m) and outdoors (2.37m), and Debbie Marti, holder of the GB indoor record with 1.95m.

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Inssofar as Steve Smith has progressed from a promising youngster into an Olympic medallist under our partnership of some nine years, there should be something in the course of that journey which is relevant to the theme of our conference.

At our club base in Liverpool a system and a culture has evolved which has resulted in something of a production line of high jumpers - with five 'home grown' athletes on 2.05m and higher in 1996. So there has to be some sort of transition process in place.

No doubt there is more than one way of skinning a cat - all I can relate is the modus operandi of this particular cat-skinner!

High jump is a strange event in many ways - some of these features we will need to explore or at least touch on in due course. One notable feature is the age at which jumpers can come into the classification of 'elite' (Table 1, 2).
I am sure many of you will remember when the Scottish senior record was broken by a certain individual in the English Schools Championships, some 12 or 13 years ago? It also happened to be the British senior record! That was Geoff Parsons. Did not a Scots lad of 15 become the youngest ever athlete in the GB senior team? That was Ross Hepburn. This is all in contrast to some of our other events. Take shot for example ... In my experience the peak age for that event is 33! We cannot, therefore, share our respective difficulties or have a totally common approach to the topic of the Conference, due to the fundamental differences in such matters as skill acquisition and varying dependency on acquired strength.

To highlight the point, I indicate my view of the standards that our young people must reach, as a minimum, if they are going to make their mark at world level.

These are not far-fetched, we currently have half a dozen people in the UK who fall into that category. Seven high jumpers reached the BAF qualification standard for the '96 World Juniors.

Another surprising factor is that most of them have come through to that stage without any really intensive training behind them - in a couple of cases no real structured training at all.

So, the identification of junior elite athletes is not a factor ... they just pop up naturally. They still have to be progressed from this heady start, but there will be no late developers in high jump.

I am aware that we all cover many different disciplines and it is important in the context of this conference to avoid getting into the minutiae of high jump training and preparation.

To the extent that we are going to cover some specific high jump topics, I do so with the hope that they will demonstrate a way of thinking; a basis of operating.

It is important that we question our events, their components and their demands.

Develop some principles to live by.

When considering the development of the younger athlete, I have to have in mind the programme which I expect the individual will follow as an elite senior. To do otherwise would create the danger of embarking on a journey without knowing the nature of the final destination.

Anyway, there are no certainly no surprises in this list of the key components involved in high jump preparation, junior or senior (Table 3).

All training must be for a purpose and be on valid principles. It is no good if you do not know why you do things and are left wondering whether what you do will work. ALWAYS DO THINGS FOR A REASON.

I personally need to validate what I do - and I do not see why this has to be a complicated business. The points here could be described as simplistic, but I believe all that is needed to formulate a training programme to achieve 2.40m is here.

There is a saying that "there is nothing new under the sun" and I am sure that most of you will...
be aware of these rules and principles (Table 4). But it is a bit like baking a cake - everyone has access to the same ingredients but not everyone can bake a great cake. Let's take a closer look at a couple of these:

- **Reversibility:** This has been around since 1946 and simply states that when training ceases, the training effect reverses (and this is the key) at one third of the rate of gain. I hope you will see how this forms a major part of the thinking when building strength training into the high jump programme.

- **The Compensation diagram (Figure 1):** This is, for me, the key to performance programming. The point is obvious - training initially has a negative effect. This has vast implications and affects a lot of my thinking.

- **Specificity:** This refers to an exercise which is related to the particular demands of an event. In my view, this means you can't train the high jumper even as you would the long jumper. In turn that means you have to distinguish the differences.

- **Eccentric muscle contraction:** 90 per cent of track and field training centres around concentric muscle activity. At least 60 per cent of high jump relates to eccentric muscle work. Just think, as the high jumper comes into plant and the need for them to resist the forces and stop the collapse - it is all eccentric. The faster the approach the greater the forces and if you hope to convert increased approach speed into height jumped, additional eccentric strength has to be developed. What are we doing to cultivate this in the weights room and in our bounding training?

- **Training is destructive:** Many hard-working, committed athletes are frightened to do nothing, but there are times when this is the most important component of training.

As the training load goes in, the performance level drops.

When the load comes off the reverse happens to a level above the original starting point. As far as I am concerned, this phenomenon must be exploited to the full. At the macro level, say the winter training block, the process starts with a reduction in the intensity and volume of training, which signals the start of the Adaptation or, as I prefer to call it, the Taper Period. The extent of the reduction necessary varies tremen-
dously from event to event, but the optimum taper down is particularly dramatic in the case of high jump, in my experience.

**The compensation principle in the training programme**

It is worth examining the compensation principle in closer detail. Training intensity and the duration of both training and recovery periods will determine whether the desirable 'staircase' effect is achieved (Figure 2).

There is little or no guidance available as to the optimal training levels nor the recovery activities which will deliver the required result. Or if there is, I don't know where to find it. To be fair it is not possible to generalise on this issue. Conditioning history and the age and development of the athlete are among a host of factors to be taken into account.

For me this is an area where the science of coaching tends to give way to the skill of coaching. Judgement as to when you can turn the screw and when to pull back.

**The 'staircase' effect**

This is a schematic representation (Figure 4) of the processes involved when you get things to go right or, indeed, how and why they go wrong.

This not only sets the guidelines for the mature experienced athlete but, I believe, gives a clue as to how to manipulate a training regime to suit the developing athlete.
Fitness vs fatigue

Taken in conjunction with the principles illustrated above, I think I can programme for the developing athlete with some confidence that I will be on the right track.

Essentially, this says to me that it is not the nature of training of the elite athlete which will cause difficulties for the youngster, but the length of time over which it is applied and the amount of rest which is applied thereafter.

OK, there are individual loadings which will need to be moderated - you would not want to give a weighted jacket to a 17-year-old and some single leg work can (and should) be converted to double footed, but in most respects the programme can be the same.

That is a real bonus as far as I am concerned. It means I can have a wide ability range and athletes in various stages of development in the same group, doing fundamentally the same individual elements of training.

That is not to say that I have got it right every time, I have had a few cases of over-use strain in the quadriceps, but thankfully no major injuries yet.
If we are not to look towards the specific training requirements of the event, we cannot go much further without defining the target. You cannot take the right road to anywhere without knowing the destination. No matter what your event, it can do no harm to reflect back on the fundamentals from time to time.

Question: What is the destination in the case of high jump?
Answer: VERTICAL VELOCITY AT TAKE-OFF!

If we are concerned with speed in this event - it is the speed generated in that brief, single leg, dynamic, reactive, explosive moment. Surprisingly, this does not seem to be a problem for the more able of our youngsters - and even those without a particularly demanding training regime behind them.

Whatever training I might be doing, I always ask how it is going to contribute to vertical velocity at take-off (and that means I must not run away from the answer if I do not like it!).

Anyone who embarks on a training regime without addressing these questions (Table 5) cannot be sure whether what they are doing is right.

It is probably not our remit to cover many of these today, and we have actually looked at some of them already.

In terms of training for running speed, there is surely no high jumper who does not naturally possess enough speed to jump high - even I can get up enough steam!

What happens when we strength train? Basically our ability to jump disappears! But we must have the max/gross strength to
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stop the leg collapsing when planting for take-off.

How do we resolve this dilemma? Essentially the right programming will sort this problem out for us.

What is the role of fitness and stamina? We need to go back to consider vertical velocity at take-off to answer that ... fitness contribution? ... NONE!

You can be unfit and jump high.

I actually eliminated fitness from my 95/96 training package and everyone in my squad did well enough on that, but I found that the ability to jump high over a long period was affected, so fitness went back in for 96/97. I have no 'rules' to prove that, just bitter experience!

When to jump in training? Now this is a big question ...

Too many coaches feel that they are not fulfilling their destiny if they do not regularly coach the act of high jump. While it is fair to say that a hurdler needs to hurdle, say, twice a week, a high jumper who knows how to high jump is not going to forget how to and the four to five weeks of taper is the time to re-introduce high jump technique and this will be sufficient to bring all the timing back. To sum up, we know training ruins jumping, so why jump when you are training?

How long does it take to eliminate the effects of a heavy leg session? I believe there are papers on this, but I found out the hard way - nine days appears to be the answer and this provides me with another golden rule to programme by, as we will see shortly.

When can we implement an elite programme? Certainly from age 17 onwards ... up to then jumping technique must be the priority.

Get the programming wrong and you have got no chance (Table 6, 7).

- How long can you productively train for? Athletes' capacity varies - but it will be between 8-10 weeks, in my view, before the wheels start to come off and they are over training.

- How do we achieve a peak? Simple ... stop training.

Programming issues

- For how long can you train?
- Achieving the peak
- Sustaining the season
- When to jump in training
- The role of basic conditioning in the programme
- Solving the strength training puzzle
- Structuring the week
- How long is the taper?
- To programme: work backwards or forwards?

Table 6

High jump stands alone

- is very sensitive to heavy training load
- responds very positively to recovery
- Neither sprinting ability nor stamina are necessary to jump high
- There is no need to jump extensively in training
- Eccentric muscle contraction is a predominant factor
- Elite world levels are often achieved at a young age

From all this we can see that, in many ways, HJ stands alone from other events all of which sit under the big umbrella called "track and field". So it must have its own rules. If you train for HJ as you would for other events one or the other is going to be wrong!

Table 7

- When to jump? When all the other detrimental training has stopped.
- Basic conditioning? It does not affect the ability to jump high, but it does help to sustain the season.
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The weekly programme (micro cycle)

<table>
<thead>
<tr>
<th>The Training Diet</th>
<th>The Training Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plyometrics</td>
<td>Monday</td>
</tr>
<tr>
<td>3 sessions</td>
<td>Plyos &amp; Condition</td>
</tr>
<tr>
<td>Conditioning</td>
<td>Tuesday</td>
</tr>
<tr>
<td>3 sessions</td>
<td>Strength</td>
</tr>
<tr>
<td>Strength</td>
<td>Wednesday</td>
</tr>
<tr>
<td>2 sessions</td>
<td>Plyos &amp;</td>
</tr>
<tr>
<td>Technique</td>
<td>Thursday</td>
</tr>
<tr>
<td>0 sessions</td>
<td>Rest</td>
</tr>
<tr>
<td>Total:</td>
<td>Friday</td>
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<tr>
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<td>Strength</td>
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<tr>
<td>+2 recovery days</td>
<td>Saturday</td>
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<tr>
<td></td>
<td>Strength</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
</tr>
<tr>
<td></td>
<td>Rest</td>
</tr>
</tbody>
</table>

Table 8

- **Strength training** provides the qualities we need to handle the high jump plant but we have to undo the 'damaging' effect this work undoubtedly has (maximum strength is slow strength).

This is done in two ways: Firstly, by stopping it altogether. Secondly, by running the strength work parallel with dynamic/explosive plyometrics.

- **The strength of the taper?** The compensation diagram does not actually tell us this - experience tells me it is four weeks or more.

I start working out the structure of the weekly programme by determining that there should be two rest days. I would rather double up sessions on one day than lose a rest day.

If two weights sessions are accepted per week as sufficient, then that leaves three days to play with (Table 8).

If the conditioning and the plyometric sessions can be combined - both being three each per week - it all slots in well. Conditioning and plyometrics can, I find, be put comfortably together on a split routine basis (Table 9).

Above that there is no obvious layout for the week or the insertion of the rest days - a block of three sessions and a block of two sessions is unavoidable.

The make-up of the main thrice weekly session has to be broken up on a split routine basis.

After November we will often start with some fast running work in the hope that there is some carry-over between the short, quick foot contact in the sprinting action and that which we are so desperate to cultivate in the high jump arena!

The plyometrics and conditioning elements then alternate to break up the onslaught and offer some rest to the muscle groups.

There are, of course, basic rules that have been established in respect of plyometrics (Table 10, 11).

The rate of the stretch/shortening cycle is critical to our event and helps to explain why many high jumpers are not impressive when performing static jumps such as the vertical jump and standing long jump - but off a few strides can create much greater forces. Look for quality rebounding to acquire the necessary responses.

Originally, plyometrics referred to depth jumping involving a 'rebound'. Obviously this closely mimics the high jump as both have an eccentric contraction followed by a concentric contraction, and our plyometric sessions in the specific phase should replicate this pattern (Table 12).

So this is one way of being more specific. Another is to concentrate on single leg work, which can also expose weaknesses hidden by double footed rebounding.

Table 9

<table>
<thead>
<tr>
<th>Typical daily session (unit: three per week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Plyometrics</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Conditioning</td>
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<tr>
<td>1</td>
</tr>
<tr>
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<tr>
<td>2</td>
</tr>
<tr>
<td>Conditioning</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Two Hours (Max)!</th>
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</table>

Table 10

- The rate of the muscle stretch is more important than the magnitude of the stretch.
- Higher intensity requires greater recovery.
- Optimal numbers: 8-10 reps; 6-10 sets?
- Depth Jumping Optima: 74cms drop best for speed; 110cms best for dynamic strength; 110cms + ineffective.
- A rebound exercise is an eccentric contraction followed by concentric (=HJ).
- Plyometrics develop the neuromuscular system, not just contractile tissue.
- Specific exercises achieve specific adaptations.
- Repetition work with a load less than overload tends towards endurance not power/strength.
Always remember that plyometric work is also intended to rehearse neuromuscular responses and not just work the muscles.

The point to make is that the same exercises from the plyometric menu can be used to achieve different objectives. Certainly there should be a progression over the training block and into the competition period and the content of the bounding sessions and their execution will alter dramatically - even using the same exercises.

In many respects there appears to be nothing more than common-sense in initiating a strength programme, but that is said from the perspective of someone who has been personally following a strength training regime for 30 years and continues to do so (Table 13).

I take for granted the instruction necessary to coach lifts such as the squat, clean and snatch. If a 60kg female aspires to repetition squat with 140kg, as Debbie Marti does, it will only be achieved (and safely) with fastidious attention to the detail of technique.

I have taken a 17-year-old female (again 60kg body weight) from novice to 100kg squats, for reps, in seven months, but if you are not confident in this area, you must delegate this work to others.

Sooner, rather than later, our youngsters should be feeling as at home in the weights room as they do on the run-up, or on the high jump fan. This is one of the best contributions we as coaches can make to our athletes.

Initially; despite our best efforts and with the best will in the world, the weights are just not going to be heavy enough to make any real strength gains, especially as their natural leg strength is already quite high through several years of training for athletics - but they will get there.
Eventually you hope that they will be squatting over 200kg for reps like Smith - but that brings its own problems - and that takes us into advance scheduling ... perhaps another paper sometime ...

It is no surprise to me that Jonathan Edwards' weights instruction relies on a hammer coach, Smith's on a shot coach and this year our top junior female high jumper has benefited from input from a discus coach!

Table 14 shows my particular weights exercise menu and you will notice the absence of the classic power exercises of cleans and snatch.

Despite the fact that Jonathan Edwards has based his recent successes around these - it has taken him 10 relatively unproductive years acquiring the skill and confidence necessary to apply the loadings that will produce the requisite strength training returns. I have tried to develop a package which will provide a shortcut yet deliver the same results.

Nevertheless, there are three or four exercises in my 'menu' which attempt to exploit this relatively uncharted area (Table 15).

Summary

Most of the components we started with have been given some attention (Table 16).

Establish or reaffirm your principles (but re-appraise them at the end of each season).

Question the components of the event and their demands.

Hopefully, have a good technical model in place by the age of 16 - early success based on conditioning does the athlete's long term development a great disservice.

The purpose of conditioning up to that stage is education, familiarity and preparation for later training regimes.

Bear in mind that the elite junior in the early stages is more likely to be able to deal with basic fitness conditioning rather than plyometrics and strength work; increase the load gradually and progressively.

In summary, if you have taken an athlete through from novice, it is unlikely that the 'same but more' is going to be the answer.

The emphasis is going to switch from a skill base to a conditioning regime, almost overnight in many cases. You do not actually need to be a high jump coach to do that!

And that is where I came in!

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