



"I know what's wrong. Your headband isn't tight enough."

Taking A Closer Look at Errors

by Dayna Daniels

A two-part approach to dealing with athlete 'errors': Looking at what's 'right', then what's 'wrong'.

In the day-to-day dealings with sport, coaches have a host of duties and responsibilities. One of the most important is to maximize the athlete's development of skills. Probably more time is spent on this aspect of coaching than on any other, particularly at lower levels of performance. But irrespective of the level, each athlete's improvement in skill is ultimately dependent on one thing – the detection and correction of errors.

Performing skills well is important for many reasons besides successful participation in the sport. Prevention of injury and self-satisfaction must be considered as well. In certain sports such as diving, gymnastics, figure skating and judo, basic skills must be learned and perfected before more advanced skills and techniques can be developed. For an athlete's performance to improve, in other words, errors must be overcome.

Definition of Errors

No one would disagree that errors inhibit performance and should be corrected. But does everyone agree on a definition? Just what is an error? Most people would probably respond that an error is a mistake. But for the purpose at hand an error might be better defined as the gap or difference between what is observed and what should be taking place. Maybe this is so obvious that it is trite. But 'what should be taking place' becomes critical in determining whether an error actually has occurred. Differences between what is observed and what is expected will constitute an 'error' only if the objective that has been set for the particular athlete or group is in fact realistic and attainable.

The first step in setting objectives involves defining the skill, action, or series to be taught or observed. The definition must include an estimate of an appropriate level of performance for the age and experience of the athlete.

How particular movements should look will vary dramatically from one athlete to another. What constitutes an error will therefore also vary from athlete to athlete. Knowing this, the statement of objectives for each athlete must be thought out carefully, for even elementary movements performed by

different individuals may appear to be different. Errors may be created or avoided, that is to say, just by the way in which the performance objectives are set; unrealistic objectives will "create" errors.

Error Correction

When a new skill is first introduced to an athlete the coach is likely to see tremendous variation between what was expected and what was observed. This, according to the above definition, is an error. But herein lies a little problem – just enough of a problem to test any good coach's mettle. Some of the observed variations in performance are attributable to variations in individual techniques and not to errors proper. These variations will not interfere with the execution of the skill. Even though they fit the definition of error, errors they are not.

So how can a coach determine if a gap between the expected and the observed is a true error or just a difference in technique? There is but one way: by rotating the telescope 180° so to speak and looking at what is being done right!

What is most important then at this stage is that the coach not focus so much upon what the athlete might be doing wrong, but rather upon what is being done correctly! The emphasis should be on the over-

all pattern involved in the skill execution rather than on the finer movements underlying the pattern. As the overall pattern becomes more automatic to the athlete small errors are very likely going to disappear.

Repetition of a movement is necessary to establish the neuro-muscular pattern specific to a performance, and if the coach praises the athlete for what is being done properly the athlete will get the positive information feedback necessary for the reinforcement of motivation and continuation of practice. Furthermore, at any level of performance, knowledge of results is a critical aspect of learning. The more effectively knowledge about positive aspects is transmitted, the more quickly learning will take place.

Should the coach, at this point, point out instead the errors that are being committed, the athlete will automatically concentrate on the errors rather than what is correct. This will slow down the rate of learning. It is possible that the good parts of the performance might be adversely affected also.

This can be illustrated by the example of overhand throwing. A coach presents an overhand throwing skill such as pitching or a tennis serve to a group of athletes. Even with a very good progression the coach finds differences among many of the athletes between the performance observed and the performance expected. (Among the most common of the errors will be 'point of release' and 'direction' errors.) Suggestions can be made such as 'Release the ball later'; 'Contact the ball higher'; 'Follow through more' — these are all good coaching interventions. But what the coach should be doing at this point is looking not only at the symptoms but also for the root cause of the observed errors. For instance, in throwing activities it is a common "flaw" for an athlete to not use all the joints needed for efficient execution. If the shoulder is held back, for example, or the elbow used incorrectly, a number of 'release' and 'direction' errors will likely occur.

The coach should carefully observe the overall throwing pattern and then reinforce the correct actions, emphasizing the proper functioning of all the joints involved. This will cause the athlete to concentrate on the correct elements and

the pattern will strengthen. Most likely a lot of the errors observed initially will disappear without ever requiring mention.

Error Prioritization and Critical Features

An important aspect of error detection and correction is PRIORIZING the errors which are observed. (I.e. How severe is the error at any given point in the training program? How much does this particular error actually affect the performance? What is the CAUSE of the error?) Prioritizing allows the coach to decide which errors need to be worked on first, or if indeed the errors need to be explicitly dealt with at all. A number of factors need to be considered when prioritizing errors.

1. The level and ability of the participant will have a tremendous bearing on judging how severe an error is. A beginner will commit many errors, both large ones and small. The coach must therefore first examine the "critical features" of the skill during performance.

"Critical features" are those components of an action which affect the overall performance of a skill in the most fundamental manner. If a critical feature is not performed to the expected level it will result in error, and this may occur immediately or it may not show up until later. Critical features must be identified for each level of performance. While for the most part they will be the same for all levels of skill performance, some may need to be emphasized differently depending upon the group.

In the throwing example, for instance, a critical feature is the utilization of a full range of motion in the shoulder girdle. This one single component of an action can be the difference between a smooth, co-ordinated throw with proper force and direction, or a jerky, uncoordinated throw with little force or control. Another critical feature in many throwing activities is the stepping off with the foot opposite the throwing arm, creating thereby the optimum potential for summation of forces. This may not be quite so important at the outset for very young athletes so its importance as a critical feature will vary with experience and maturity.

If a critical feature error is detected it should be the first thing to be corrected even if it doesn't appear

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to be particularly bad. Should a serious error occur later in the skill, it is most likely the small error in the critical feature which is causing the more severe error to appear. Again, it is not necessarily the worst or even the first error observed which needs to be corrected. The priority of performance actions must be considered.

Another example of poor performance of a critical feature causing later errors occurs in running. A critical feature for any level of running is the placement of the foot at foot strike. The foot should contact the ground as nearly below the centre of mass as possible. If foot strike occurs ahead of the centre of mass overstriding occurs. This can cause too much up and down motion, jerky rhythm, loss of speed, and also knee problems.

It can be seen that the cause of many an error is the poor performance of a critical feature. Locating the root cause of the error must therefore become a prime concern of coaches wishing to correct and to improve performance.

2. Another aspect of error detection and correction is based on realistic expectations of the performance level. If the objectives set for an athlete are too precise, too detailed and ambitious, many 'errors' will be observed. The younger and less experienced the athletes are, the less exacting should be the statement of objectives. The performance expectations should be based on an image emphasizing the overall movement pattern and the most important critical features. Youngsters and other beginners will not be able to perform sophisticated movements well

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at first. This is another reason for prioritizing errors; the differentiation between performance variables which must be performed well right off the bat and those which are not as important at this time must be determined in advance of observation by the coach.

At the opposite end of the performance spectrum though, coaches must not set too low an objective for high level athletes or the athletes' performances will be 'better' than expected. The result of this could be that these athletes will show no improvement at all over time.

3. An 'error' cannot be classified as such if the athlete cannot realistically adapt his or her performance. If the performance of a skill requires a certain amount of strength for example, errors will be observed in the case of a weak athlete who has to struggle to complete the action. The coach must be able to identify 'performance errors' such as these, i.e., caused by a lack of strength, flexibility, power, agility, endurance, etc. Obviously, the coach and athletes must be patient in such circumstances or modify the objective sufficiently so that it corresponds with the athlete's level of strength. This helps to prevent the development of bad habits which might interfere with proper performance once the necessary strength is developed.

4. Athletes experiencing rapid growth spurts or changes in weight might suddenly develop 'errors' in skills which were previously performed well. Again, there is little the coach can do about this except reassure the athlete, modify performance expectations and wait for the athlete's physiological changes to settle down. It is possible that skills performed to a fairly high level before a growth spurt or the onset of menses will have to be relearned by an athlete whose body is now a new shape with different strength and flexibility characteristics. Coaches working with athletes in the pre- and

early adolescent years must be very patient and must expect radical performance changes in their athletes. Overall expectations of performance may need to be periodically re-evaluated by coaches working with the pre- and early adolescents. Certainly errors in performance caused by these changes will not be easily corrected. Therefore modifications in performance should be accommodated until the athlete gets used to a new body and is ready to relearn old skills.

5. Time is a very important factor in error detection and correction schemes. How long might it take to change a performance and how much time is available? If an athlete has a minor problem which doesn't drastically affect performance and there is little time before the next competition, it is probably in the best interests of both coach and athlete to forego any attempt at correcting the error.

If errors are caused by deficiencies in physical components such as strength or flexibility, the coach and the athlete must be aware that an eight to 12 week, three times a week, training program may be required to effect an improvement which will be relatively stable and permanent if maintained. Off- and pre-season schedules are best for this type of training.

6. Other considerations apply in the detection and correction of errors when coaching skilled athletes. Oftentimes a relatively highly skilled athlete will execute a performance in a manner which appears strange or awkward to the observer. Coaches must be very careful when attempting to change successful performance simply because the observed performance looks different from the expected one. Individual differences must be allowed. Often the best athletes in the world have different styles. Many coaches have learned that copying 'odd' styles doesn't work too well as a method of improving performance.

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"He just broke the record for the most errors in one game."

7. One of the most important justifications for error detection and correction is the prevention of injury.

Errors could result in acute injury or lead to the development of chronic problems over time. Acquisition of a skill must never come above the health and well being of an athlete.

When analyzing sport skills coaches should keep in mind four basic principles in the area of error detection and correction:

1. Identify the skill to be taught or observed. Know the critical features of the skill; this is the key to successful performance.
2. Set realistic objectives for the skill to be learned, geared to the age group and skill ability of the athletes involved.
3. Prioritize the errors observed and consider the consequences of changing the performance. Remember: the cause of an error is the action to be corrected - not necessarily the observed error itself. A coach must keep in mind that: 'What you see ain't always what you get!'
4. Keep an open mind about all skill performances. Be pragmatic, not dogmatic. Emphasizing what is being done correctly in a performance is always a better method of skill development than concentrating on errors. (6)

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