Orienteering analysis - Plan, Direction, Picture.

Analysis of performance plays an important role in the coaching cycle and a knowledge of the critical features of orienteering performance and their role in an athlete's individual process of orienteering is vital in ensuring effective analysis takes place. Plan, direction, picture and route choice are proposed as the critical determinants of performance and they form the basis of a generic process of orienteering. Their role in the analysis process is to ensure that analysis remains relevant to orienteering performance. As well as relevance, it is important that analysis be consistent, objective and applicable to future training.

Introduction

Performance analysis, as a discipline of sport science, focuses on the provision of objective feedback to a performer in order to produce a positive change in performance. Franks (1993) found that experienced coaches in gymnastics were no better than novice coaches in detecting the differences between two hand-spring performances presented sequentially. In addition, the experienced coaches identified more differences where none existed, than their novice counterparts and were more certain of their decisions, even when wrong. Providing objective feedback to a coach or an athlete can allow the coach and the athlete to make informed decisions about improved performance.

The aim of this article is to examine orienteering performance and in particular how it may be possible to analyze a performance more effectively. Rather than suggest new methods by which a performance may be analyzed, the considerations which underpin the success of performance analysis are discussed. It is hoped that this article will bring together some useful information and provide 'food for thought'.

Defining the critical features of good orienteering performance.

Before beginning to understand how to analyze an orienteering performance it is necessary to understand good orienteering performance; what is it that we are searching for?

The winner of an orienteering race is the competitor who completes the course marked on their map in the shortest amount of time. This will be dependent on a number of factors, some of which are under the runners control, others are not. In order to define the critical features of orienteering performance we need to investigate the factors which are under the runners control and how they are related to performance. To begin this process these factors will be generalized to physical factors and technical/tactical factors.

For example, if the 'optimum' route around the course were marked in the terrain and the athlete raced around without the pressure of navigation, the factors involved in this race (i.e. the athletes fitness, agility, strength etc.) could be thought of as the physical factors determining performance. However this is not the case and the athlete must use their map and compass to navigate between the control points in the terrain. The athlete will use a number of skills, techniques and tactics to complete the course as close to the optimum route as possible, whilst still running at as high a speed as possible, and these represent the technical/tactical factors involved.

The main interest in this case is in orienteering technique, i.e. the technical/tactical factors. The effect of physical factors and their improvement falls outside the scope of this article, although it should be noted that increased physical fitness will have result in an orienteer running at higher speed which will have an

effect on the runners ability to navigate the course effectively if all other factors remain the same. This separation of physical and technical/tactical factors leads to the assumption that two athletes could orienteer to the same standard despite having differing levels of physical fitness. This assumption is most likely flawed due to the effect of speed on navigation (e.g. the athlete who can run faster may have to have a higher orienteering skill than the one who is running slower as they will be passing through the terrain quicker), but it serves its purpose of separating the factors.

The next step in the process is to define the individual technical/tactical factors and how they are related to orienteering performance. In coaching texts, a number of techniques or tactics have been put forward to increase orienteering performance, for example: fine and rough compass, contour interpretation, simplification, visualization and numerous others (McNeill, 2010). However, their links to performance and their role in the process of orienteering is unclear. Sports Biomechanists have used deterministic or hierarchical modeling to graphically link the technical or mechanical aspects of performance. In a deterministic model the performance goal is listed at the top and all of the factors in a level should be completely determined by the factors in the level below (Hay, 1984). An example of a deterministic model, linking the factors effecting sprinting performance (Hay, 1993), is shown in figure 1. By increasing stride rate or stride frequency average speed can be increased and therefore performance can be increased.

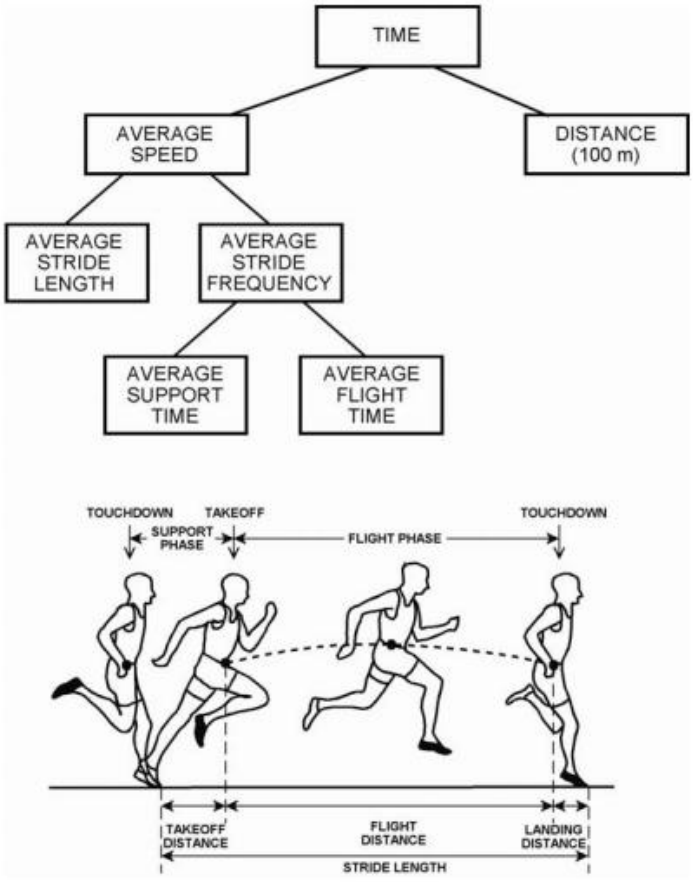

Figure 1. A deterministic model of sprinting performance (From; Hay, 1993)

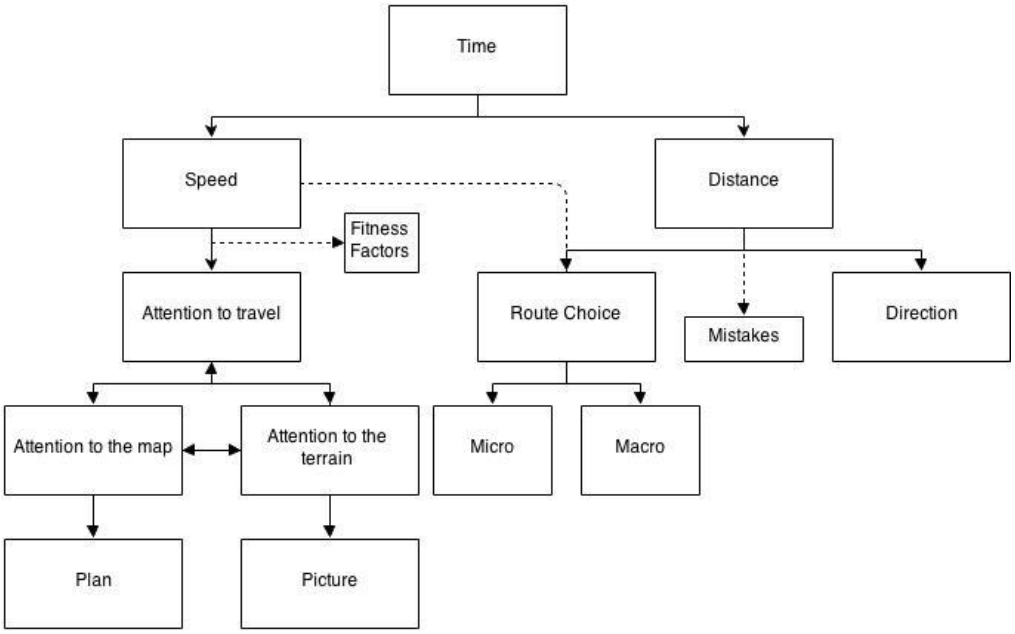

Figure 2. A deterministic model of orienteering performance.

The deterministic model of orienteering performance shown in figure 2 was created in the following way: Firstly, the goal or outcome of successful orienteering was identified; in this case taking the least amount of time to run a given course. The level below shows the factors which directly affect the time taken; namely speed and distance. This gives us our first three factors on which to base the model.

Improved physical conditioning (fitness) will allow the athlete to have higher speed but there are also technical/tactical factors involved. Through a grounded theory investigation with the British Orienteering Team, Eccles, Walsh and Ingledew (2002) hypothesised that increased speed in orienteering is linked to the interplay of three factors; attention to travel, attention to the map and attention to the terrain.

The first of these, attention to travel, directly affects the speed with which the athlete can run through the terrain. Paying more attention to travel allows the athlete picking out the fastest route in the terrain and avoid unnecessary obstacles including trips and collisions. In order to navigate the course however, the athlete must pay attention to both the map and to the terrain to obtain information about their location and the direction which they must travel.

Their finite attention must be shared optimally between these factors for a successful performance. When the athlete is attending to either the map or the terrain they are attending less attention to travel and this will reduce speed. Reducing running speed to read the map will decrease orienteering performance but also reduces the chance of making a navigational error. Furthermore, the athlete will have other thoughts not directly linked to their orienteering technique, such as other athletes or reflection on actions already undertaken (Macquet, Eccles and Barreaux, 2012) and as such elite athletes will use a number of cognitive and behavioural strategies to allow them to manage this balance and the natural limitations on attention (Eccles and Arsal, 2014).

There must surely exist a myriad of techniques which could be used to effectively make use of attention paid to either the map or the terrain. Excluding behavioural techniques such as folding the map and

holding the thumb over the last known position (Eccles and Arsal, 2014), in terms of attention to the map, it is suggested that these techniques fall into the category of planning. The logic behind this grouping is that if the athlete begins a leg with a simple plan of their approach, they will have to spend less time consulting the map to make further decisions. With regard to attention to the terrain it is hypothesised that attention can be optimised by having mental representation of the terrain which needs to be travelled through. If the mental representation is accurate and matches the terrain on the ground it should allow for more effective use of attention. In this model, techniques used to decrease or effectively make use of attention to the map are summarised as plan and in the case of attention to terrain are summarised by picture.

At this point it should be noted that the term 'picture' is not a perfect term for what it encompasses. Anecdotal evidence suggests that whilst some athletes may have a mental image (a picture in their mind of what the terrain will look like), many will not have this image. Rather some athletes use their experience and visual inspection to identify whether the map fits the terrain or vice versa. There may also be other examples of how athletes optimise their attention to the terrain. As such, 'picture' is not an ideal term to use as it evokes only one type of thinking, however a simple alternative has not been found.

Returning to the other side of the model, distance is determined by the athletes choice of route around the course. Both the athletes overall route on a leg (macro) and any smaller variations in route through specific sections of the terrain (micro) will contribute to their overall route choice. Distance will also be determined by the athletes ability to run straight in the terrain as opposed to running curves or s-bends (direction) and by any extra distance the athlete adds due to a mistake or lapse in concentration. It is worth noting that whilst decreased distance is a benefit, Macquet, Eccles and Barreux (2012) summarised the route choice decision as a trade-off between length, runability, surrounding vegetation, navigational simplicity and the level of fatigue of the athlete. Thus whilst route choice affects distance travelled, it will also affect the speed the athlete can run at and their process of navigation and these factors need to be considered in the route choice decision.

The use of this model presents us with four factors which can be easily related to orienteering performance; Plan, picture, direction and route choice. Extra distance due to mistakes has been omitted at this stage as it is suggested that this is the observable outcome of a poor performance due to one of the other factors. It Noting the extra distance (or time) due to a mistake might provide a useful insight into the magnitude of a mistake however it should not be assumed that a small mistake only means a small error in orienteering. Such is the nature of orienteering that in some cases an athlete can 'get away with' poor orienteering skills without a large time loss and vice-versa, a small error may result in a much larger time loss. Knowing the relationships between these factors provides the basis of a structure to think about orienteering performance further.

It should be noted that in general the four factors we have identified are constructs, used where the model moves from measurable outcomes (speed, distance etc) to an orienteers thought process. As such they are catch all terms, they are intentionally wide ranging in order to be widely applicable and should be examined in terms of an athletes individual thought processes and approach. An athlete may wish to further divide these factors to examine their own processes which may lead to opimisation of their attention to the map (plan) or to think about orienteering differently in a way which fits into their individual orienteering philosophy.

The orienteering process.

Some thought should also be given to the process of orienteering; what does an athlete think and do when they are orienteering well? The critical features of orienteering performance and how they are related to each other have been set out, but how do they fit into the process of orienteering?

The process of orienteering is often referred to as the athletes orienteering technique however due to the possible confusion between this term and the various discrete 'techniques' they might apply during the race, this article will refer to the athletes orienteering process.

It could be noted that whilst we have four factors (plan, direction, picture and route choice), three of these factors relate to the technical aspects of navigating a given leg whilst the final factor, route choice, relates to a choice made on how to approach a given leg. It could be assumed that you could orienteer a 'slow' route choice very well with the application of plan, direction and picture. Furthermore, once you have chosen a route choice it might not be possible to change it, whilst plan, direction and picture are more continuous along the leg. This is important as it seperates route choice into its own factor which can therefore be thought of and analysed independant to the rest of orienteering performance.

The remaining factors (plan, direction and picture) could represent, very simply, an explaination of how to orienteer. They do so in much the same way as; get up to speed quickly, run as fast as you can and try not to slow down would represent an explaination of how to run a 100m quickly. I.e. in a very basic way and one which might not be of much help on its own, however they serve a purpose in providing the base of a simple process of orienteering which can be developed. To give an example; the athlete would make a plan of how to approach the next section of course (which would include their route choice among other things) and then to excecute this plan the athlete would travel in the appropriate direction (using compass and map reading to ensure they are indeed travelling in the correct direction) and identify features in the terrain to ensure that they are following their chosen route and help them to locate the control. They do this by comparing their mental representation of what the terrain should look like with the terrain they are seeing.

Thierry Gueorgiou, multiple world champion and widely regarded as one of the best technical orienteers ever, has described his orienteering technique as being based on identifying the most visible and distinct features in the terrain (and ignoring many small details of the terrain), trusting his compass and keeping his head high throughout to identify key features (Kobach, 2010). This is remarkably similar to the structure we have described, although it is not described in such words. Indeed much of what follows is simply a combination of existing ideas and it is fully expected that many athletes already use an orienteering process which is similar this.

This example highlights the extra detail needed alongside this structure which allows the structure to be viewed more usefully in relation to performance. i.e. it is not good enough to say that orienteering technique should be based on having a good plan, direction or picture. Rather, an understanding on what constitiutes 'good' is needed; in particular regarding the plan.

The plan constitutes the over-arching vision of how to approach a section of course whereas having good direction and picture facilitate the execution of the plan. It is conceptually easier to imagine what constitutes good direction or picture i.e. good direction is such that the athlete is able to stay within a narrow enough 'corridor' to be able to see the features they wish. This can be done using compass, linear

features or groups of features in order to ascertain direction. A good picture would be such that the athletes perception of the terrain from the map (what things look like, what is visible, what is distinctive etc) closely matches the reality in the terrain.

Deciding on what could constitute a good plan is more difficult although Gueorgiou's description of his planning process (Kobach, 2010) highlights some of the key factors that might be issues here. Firstly, it is likely to be faster to identify key features on the leg rather than attempting to read every feature that will be passed. Secondly, the visibility of something in the terrain is important to consider, if it is visible from far away it is more likely to be useful for navigation. Finally, the uniqueness of the object could be considered as this makes the feature more distinct and less likely to be confused with a similar feature and therefore more useful for navigation. It could be noted at this point that whilst they are slightly different, there is potential for overlap between the plan and the picture. This could be thought of as when forming either the plan or the picture the athlete will often form the other at the same time.

As well as what is included in the plan it is also important to consider when the plan is formed. An overall plan for a leg may be formed at the beginning of a leg but the athlete might form more a detailed plan when they are closer to the control (Macquet, Eccles and Barreaux, 2012). Plans can only be formed when the athlete is reading the map. Lerjen (2010) proposed a theory of five types of map contact along with their properties and effect on speed and this theory is summarised in the next section.

It should be noted that in this article two words have been changed from Lerjen's original theory as they did not fit with one of the unwritten rules of this article; to avoid unnecessary 'jargon' terminology. It is my belief that complicated terminology adds nothing to the discussion of orienteering technique and such I have attempted to use the simplest terminology possible. Lerjen (2010) uses the terms 'beacon' and 'visionary head start', which I have replaced with 'key feature' and 'buffer zone' as I believe that this is simpler terminology which makes it clearer what is meant by each term. Lerjen's (2010) theory on map contacts is freely available and I encourage readers to read it directly as well as reading what follows.

Lerjen (2010) proposes that for effective orienteering an athlete would have a plan for next section of the course which involves identifying the 'key features' for that section. These key features divide a leg into segments and are used for navigation and confirmation. The use of key features as part of a plan, is also highlighted as a strategy that expert orienteer's use to reduce the complexity of navigation and optimally manage the demands on an athlete's attention during orienteering (Eccles and Arsal, 2014).

Whilst an athlete will likely have an overall plan for the leg, they will also intensively plan the next section of the course to allow them run with highest speed (Macquet, Eccles and Barreaux, 2012). This will be called a 'buffer zone'. The athlete will know exactly where they are going until they reach the end of this buffer zone and can use this time to run faster and to prepare the next section of orienteering so that they never reach the end of the buffer zone. Whilst they have a buffer zone the athlete can look at the map at the easiest moment rather than having to read the map on the roughest terrain or at an inopportune moment, allow them to run with the greatest speed. The use of a buffer zone also allows the athlete to spread the attentional demand of orienteering, avoiding peaks of demand and distributing processing over time (Eccles and Arsal, 2014). This buffer zone might range in size depending on the nature of the course being attempted and it should not be assumed that a larger buffer zone is better. Reading too far in front could result in losing contact with what is happening next and could result in a mistake. Thus, controlling the size of this buffer zone is important for effective orienteering.

Following on from this description of effective orienteering, Lerjen (2010) proposed 5 main types of map contact:

1) Retrospective - If the athlete does not know where they are, they might look at the area they have passed and try to work out where they are based on what they have seen or can see.

2) Reading the next step - If the athlete does not have a buffer zone then they will need to look at the map to know where to go next or they will have to stop. During this type of map contact only the key features in this next step are used and a buffer is not created.

3) Visionary - Visionary map contact stretches the buffer by adding key features to the plan which has been prepared. A sub type of visionary contact would be preparing other legs so that less attention is needed when the leg is attempted.

4) Affirmative - Affirmative map contact occurs when the athlete is sure of where they are and where they are going and sees something they did not expect. The athlete then checks to ensure that they are in fact correct.

5) Detailing - After having created a plan with the key features for the leg, the athlete might spend some time identifying additional features which they may pass in order to make their orienteering more stable.

It is also possible that an athlete attempts to read their map but obtains no useful information from the map contact.

Lerjen (2010) proposed that these different types of map contact take different lengths of time depending on their properties. It was proposed that retrospective map contact takes the most time, followed by visionary and detailing. Both affirmative and next step contacts take very little time. Next step contact is very short and only prepares a short distance ahead of the athlete. Thus when this distance has been covered they must make another map contact, regardless of the terrain or situation they might be in. If this contact is not possible, for what ever reason, then the athlete either needs to slow down or continue without map reading which might result in further loss of time. Therefore, whilst visionary map contact might take longer, it allows for the athlete to perform 'safer' orienteering and reduce the potential for costly time losses.

A general orienteering process, could be summarized as; Having a plan based on identifying the key distinctive features on the leg, preparing the next section of the race as a buffer zone (to avoid next step and retrospective map contacts), holding good direction and having a good picture (mental representation) of the terrain to be passed. In order to execute this process the athlete will need to have high levels of orienteering skills (such as rough and fine compass (McNeill, 2010)) and will need to select appropriate tactics to coincide with this process (such as their route choice and tactics such as aiming off (McNeill, 2010)). Combined with the structure behind the critical features of orienteering, the links between each part of this process and performance can be more clearly seen.

It is not the purpose of this article to influence coaches or athletes to adopt this structure or the process behind it of deconstructing orienteering technique into constituent parts. Each athlete or coach is entitled to their own philosophy behind their performance. The purpose of this article is to highlight the benefits of a structure and the ways in which it can help to guide the analysis of performance.

The orienteering process has been examined in a very general way, without any thought to the differences in disciplines or terrain which are encountered in orienteering. It is my belief that where the different disciplines in orienteering differ, is not in different skills but in the balance of those skills needed to be successful. Thus a generic orienteering process should be applicable across different disciplines and in different terrain types if some thought is given to the differences. For instance, sprint orienteering requires the athlete to put a large emphasis on choosing the quickest or shortest route. A small loss of time on a route choice could be decisive in the outcome of the race. However, in a middle distance race, route choices are likely to be less significant and optimizing the navigation on the leg is more likely to be a significant factor. Therefore, more attention could be paid to analyzing the most important part in each discipline.

Analyzing orienteering performance.

The critical features of performance have been linked these to a 'philosophy' of an orienteering process which should help to examine orienteering performance; how and where performance increases could be made. This would be known as performance analysis and is an integral part of the coaching/learning process. The coaching process is the dynamic process through which coaches aim to improve a participant's skill in a given sport.

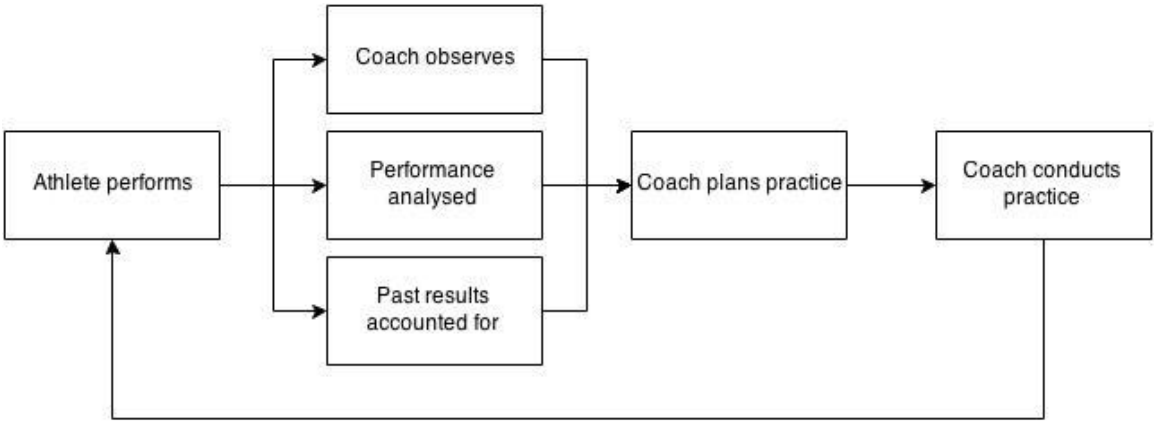

Figure 3. The coaching process (Adapted from: Franks, Goodman and Miller, 1983)

A key part of the coaching cycling, shown in figure 3, is observation. Orienteering is fairly unique among sports in the fact that the skills and techniques required to compete successfully are almost completely unobservable. Whilst the outcome of a given performance can be observed, the process that the athlete goes through to reach this end result is inherently a mental process, involving a number of sometimes complex thought processes and learned responses and as such has the potential to be unique between athletes. This provides the largest barrier to effective performance analysis in orienteering and neccessitates a high level of athlete involvement in the process. Knowledge of an athlete's orienteering process, as has been examined thus far, should help to ensure that the athlete and the coach can examine orienteering in a known framework.

To provide a textbook definition, performance analysis is:

"*an objective way of recording performance, so that critical events can be quantified in a consistent and reliable manner. It enables... feedback that is accurate and objective*."

(Hughes and Bartlett, 2008)

Key words in this definition are objective, consistent and reliable. These factors will have a great impact on the feedback available to the athlete and the coach. By maximizing the quality of performance analysis the quality of the feedback gained can also be greatly increased and direction for future training and improvement can be more easily seen. There are therefore four factors which must be considered for optimum performance analysis; consistency, objectivity, relevance and its application to future training.

Of these factors, relevance and application to future training are relatively simple to control. Firstly, ensuring the analysis is linked to the critical features of performance can ensure that it is relevant and based on a improved performance. Secondly, a knowledge of the critical features combined with an individual philosophy of a process for orienteering will allow the analysis to inform and direct future training.

Ensuring that analysis is objective is the most difficult factor to control. Subjectivity is inescapable in orienteering and whilst an athlete's feelings will provide direction to focus analysis, it is important for accurate feedback that analysis should aim to be as objective as possible. There could be a number of methods which might help to achieve this. A simple example might be to design training sessions such that there is a clear goal which can be assessed in an objective manner. Training sessions which are designed to stress one aspect of an athlete's orienteering process or one technique could be used to direct the process of performance analysis. In this regard the limit is the coaches imagination.

The main method for ensuring that analysis can be objective as possible is to use external data to inform the analysis and supplement athlete recollections. Examples include GPS data, video footage, and split times. Whilst external sources of information can provide objective measures of performance, the processing and collation of this data will increase the time needed to analyze a performance and this data might not be available or suitable to use on a consistent basis.

It also seems logical that to maximize objectivity, there is is likely to be an optimum window of time in which to perform the analysis. Athlete involvment is neccessary for full analysis of the thoughts and thought processes involved in a performance and as such the athlete will need to be in such a state to optimally contribute to the analysis. For example, if the analysis is performed too soon after the performance the athlete might still have strong overiding emotions from the performance which might make objective analysis difficult. Conversely, if the analysis is left for too long the athlete will not be able to recall significant detail on their performance. This is likely to vary from athlete to athlete and situation to situation.

Consistency might be achieved by ensuring that analysis is conducted via a procedure which can be applied to each performance in turn. This raises further considerations. For a procedure to be useful, it needs to be both widely applicable to a number of scenarios. This requires the procedure to be flexible. It is not useful if the procedure is based on external data which is not always available or only with certain

types of training courses. Simplicity is another consideration as time may be limited and it would be an advantage to have a procedure which can give useful feedback in a short space of time.

A simple procedure of analysis should involve reflecting on each control, not only controls on which mistakes were made. It should be flexible enough to allow for the input of external evidence or data and should be focused on whether the athletes' orienteering process was effective on that leg or whether they achieved pre-set goals. The procedure should also be flexible enough to be used with or without a coach present, effectively the procedure is a routine through which analysis is conducted. Whilst a coach provides additional experience and allows the athletes preconceptions to be questioned, it might not be possible to have a coach present after every session. A routine allows for consistency with or without a coach present. The routine could make use of cues such as drawing the route on the map (which might help to enhance recollection), highlighting the key features on the leg, making note of key comments or utilizing a simple rating system.

It is likely that different athletes will have different preferences when it comes to an analysis routine and some thought should be given to a routine and the associated benefits or short-comings. Different analysis techniques and sources of external data allow for greater insight into a particular performance, although if a routine is not present then feedback is going to be more inconsistent. A simple example of an analysis structure is shown in appendix 1.

Given the considerations and ensuring that analysis is consistent, relevant and seeks to utilize objective measures, it then needs to be applied to future training. A detailed analysis is likely to highlight a number of situations where the athletes orienteering processes were not up to a standard that they were satisfied with. These issues serve an important purpose in directing future training. It is likely that a judgment will need to be made on which errors are greatest. In this regard it seems sensible to look for patterns or repeated errors in the orienteering process, rather than the largest time losses, as this might give a greater indication of the underlying issues in the orienteering technique. The issues highlighted then feed back into the coaching process to allow for future training to be planned to address these issues. The analysis will also highlight positive aspects of the orienteering process. This should not be underestimated as this positive feedback will help to reinforce good orienteering technique.

Conclusion

Understanding an individual's orienteering process is vital to understanding where performance gains could be made. An ideal process or philosophy should be a main consideration of orienteering performance. Understanding this process and the factors which determine success in orienteering is important in ensuring that analysis of performance is effective. Consistency, objectivity and application to future training or performance are also important factors to consider in optimal performance analysis. Optimal performance analysis should enhance the coaching process and help to improve orienteering performance.

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Appendix 1 - An example of a simple performance analysis structure

In this next section a procedure is presented which could be used to analyse an athlete's technical performance. It is influenced by traditional "race analysis" forms, but aims to provide a slightly different approach along with being as simple as possible. It is focussed on the identification of issues in an athlete's orienteering process and as such does not attempt to account for an athlete's route choice.

Some time should be left between the performance and analysis, to allow the athlete time to recover and be able to reflect more objectively. Similarly, if too long is left between the performance, the athlete may have forgotten too much of the performance to be able to analyse effectively. Whilst the athlete should experiment on how long post-performance this should be, this length of time should aim to be consistent. It may be useful to have a coach present to lead or discuss the outcomes of the analysis.

In order to analyse effectively, the athlete should have at least a copy of the map, as this will help to facilitate recollection. It could also be helpful for the athlete to have access to additional information from sources such as GPS, split times or video.

In order to obtain a picture of how well each individual technique was working in a session, the athlete should consider each leg individually and rate their plan, direction and picture for each leg. The athlete should rate their performance on a scale of 1 (good), 0 (bad) or - (not applicable). This could be done on the athletes map, possibly while drawing their route and could be accompanied with a short comment about what was happening and why the athlete has rated themselves in this way as well as an estimation of time lost.

In order to rate their orienteering in such a way, the athlete is required to think about what consists of a good performance each part of the process. This will differ from athlete to athlete and it is important the athlete understands what they mean by a good plan, direction or picture individually. For example, a top elite athlete might be able to expect to run on their compass for much longer than a junior athlete. For an elite to have a plan that says, “run on compass until x” might be completely realistic, but for a junior to have the same plan might be expecting too much, depending on their own orienteering skills.

For reference a short description and some examples of what might be meant by “Plan, Direction and Picture” is given below:

- **PLAN** – This refers to the plan the athlete had for the leg and any strategies used to enable the athlete to find the control (e.g. attackpoint, catching feature etc.)
    - Did they have a clear and simple plan, with a good attackpoint?
    - Did they have the plan before leaving the previous control?
- **DIRECTION** – This refers to how well the athlete held their direction while running the leg and in particular to parts of the leg where the athlete was running on a compass bearing. (N.B in an urban race this may not be a determining factor would not be applicable.)
    - Did they have good direction when leaving the control, on the leg and into the control?
    - Was their compass accurate and used at the right time?
- **PICTURE** – This refers to the athletes overall picture of the leg as well as their picture of the detail encountered on the leg and within the circle.
    - Did they have a clear picture of the leg as a whole, the detail on the leg and the detail in the control circle?

Rating performance on each leg in this way should highlight issues. This can be especially useful over a period of time, where an athlete can look over a number of performances and start to see patterns evolving. Comments that are included with the analysis can help to explain the setting which can help to inform strategies for improvements in the future. It is important that these last steps are not forgotten.

Once issues have been identified, strategies or training needs to be devised that work on the athletes process or techniques to improve performance. Analysing training in this way lends itself to the setting of goals for future performances. By setting goals based on what was good or bad in a previous training the athlete can ensure that all the goals set for themselves are relevant and linked to improved performance.

To further investigate the reasons behind an issue, the athlete could use conversations with coaches or other athletes, or utilise technology in a way that will help to understand the issue further. The following self questioning guide could also be of use (Anderson, 20xx):

The Situation

What was happening in the situation?

The Cause

What were you seeing, hearing, feeling?

What caused things to be that way?

The Outcome

How did your thoughts feelings and actions affect the situation?

Your Goal

What do you want to happen now?

Given how things are, what is your goal?

The Effect

What skills, abilities and experiences have you got?

What support do you need or would like?

What will be the end result for you and others?

Using the above guide, an athlete could begin to investigate issues and develop strategies for improvement. It is important to analyse both positive and negative aspects of performance. This can help to build confidence for future performance and provide positive reinforcement.