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Achievement of Timing at the Highest Competitive Level: The Necessity of a 'Driving conviction'

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ABSTRACT

The study analyzed the responses of eight top athletes worldwide renown for their multiple Olympic Gold and other medal successes in several sports including: canoe, diving, swimming, ski marksmanship, ice-skating and marksmanship. The central issue posed during the in-depth interviews pertained to how Performance and Timing may be achieved in competitions. The interview material, analyzed according to the Empirical Phenomenological Psychological method, generated a total of 964 meaningful units, MUs, assembled in 33 categories. Six themes were identified from the interview material: a unifying "driving" thought, the long-term aspect of preparation, the direct mental preparation prior to start of competition, the experiences of athletes during performance, the coaching and external support they have received and experience of timing. A remarkable, unifying, feature of all these athletes was that each possessed a "driving" thought under which all other considerations were subjugated to the achievement of complete success at the highest level of competition. Another such feature was that participants not regarded "flow" as a necessity for top performance. Keywords: Timing, "driving thoughts", athletes, competition.

Introduction

With the financial support of the Swedish Olympic Committee and the Swedish National Center for Research in Sports an investigation was performed with eight Swedish Olympic athletes. Seven of these Olympic athletes have achieved Olympic Gold Medals and the eighth has taken two Olympic Bronze Medals. The purpose of the present study was to obtain the athletes' thoughts and experiences on performance and timing at the very highest Championship levels by applying a qualitative interview technique. The responders were free to share all aspects regarding performance and timing that they thought were of importance. The concept of "timing" is described in scientific literature (for review, see Janson, Archer & Norlander, 2003) and the definitions correspond largely with that provided in the Swedish National Encyclopedia's definition: "temporal synchronization of parallel activities (and responses)" (National Encyclopedia's dictionary, 2000, p. 1643). More explicitly, timing involves how agonist and antagonist muscles are coordinated temporally in order to facilitate the uniform and adequate movement of different joints (Williams & Barnes, 1987), whereby electromyogram studies, for example, indicate that antagonist muscles provide a "braking" force that inhibits fast (or jerky) joint movements (Janson, et al, 2003).

Flow (e.g., Jackson, 1996; Jackson, Kimiecik, Ford & Marsh, 1998; Pates, Oliver & Maynard, 2001), a concept related to timing, is defined as ”an optimal psychological state in which complete absorption in the task at hand leads to a number of positive experiential qualities” (Jackson, 2000, p.135). Since several leading sports researchers (e. g., Jackson et al, 1998) maintain that Flow is a necessary component for optimal performance, an area of research has developed that attempts to identify different components of the process(es) contributing to Flow, as well as how one may reinforce these components (Jackson, 1996). Studies performed by Csikszentmihalyi and others (Jackson & Csikszentmihalyi, 2000) suggest the presence of nine such components, namely (1) balance between challenge and efficiency, (2) fusion between action and awareness, (3) clear objectives, (4) clear feedback, (5) focus upon the ongoing activity, (6) a feeling of control, (7) loss of uncertainty, (8) temporal displacement, and (9) an experience that it is oneself that provides the purpose. Russell (2001) examined different quantitative and qualitative aspects of flow in 42 athletes recruited from different team sports and individual sports and obtained a result almost completely in agreement with Jackson and Csikszentmihalyi's (2000) nine components with regard to factors contributing to the flow experience. Nevertheless, Russell considered the situation incomplete unless one incorporated dimensions that hindered or disturbed flow.

Jackson (1995) has postulated earlier that factors disturbing or disrupting flow in athletes be considered almost uncontrollable. One such important basic component is ”physical readiness” (Jackson, 1992), which is necessary for the coordination of all movements and thereby also a necessity for flow. This component too is a condition for action and awareness to construct a context thereby in line with Csikszentmihalyi's second factors. ”Physical readiness” may be interpreted as mind and body coordination to achieve timing of muscle activity (e.g., Benvenuti, Stanhope, Thomas, Panzer, & Hallet, 1997; Hase & Stein, 1999; Strauss & Klich, 1999). Studies within this area point to the necessity of considering the gender variable whereby gender differences may underlie intensity and velocity of movement (Buchman, Leurgans, Gottlieb,

Chen, Almeida, & Corcos, 2000).

Technical skill affects both timing and muscle tension. Aggelousis, et al (2001) performed a study involving 41 subjects, aged 19-26 years, who were required to develop a new way (taking the elbow as starting point) of 'throwing a ball'. EMG-analysis of four muscles in the elbow region showed that conditions allowing more training gave better performance accompanied by reduced tension in the agonist muscle (biceps brachii) and in the most important antagonist muscle (aconeus). These results confirmed those of an earlier study (Engelhorn, 1988) on children aged 7-11 wherein better performance through exercise was associated with reduced EMG-activity in the muscles analyzed.

The influence of psychological variables upon timing and EMG analysis of muscle tension has been subjected to investigation (e.g., Braathen & Svebak, 1990) indicating effects. Frustration (Rychtecky, 1978), anxiety and worry (Adam & van Wieringen, 1988) enhances EMG-activity, while deep relaxation (Norlander, Bergman & Archer, 1999), fantasizing (Harris & Robinson, 1986) and meditation (Harris & Robinson, 1986) reduces EMG-activity. Bird (1987) describes an experimental case-study in which an elite level 23-year-old rifle marksman demonstrated that the most successful performances were associated with ability to attain relatively low levels of cortical activation. Between 'taking-aim' and 'firing' EEG-amplitude remained stable until an instant before firing, when it descended sharply, rising again to normal level after firing. Lower levels of EEG during a series were associated with higher scores. Further, Janson (1995) reported a series of case-studies indicating that the most successful athletes within different technical disciplines (i.e., bowling, boxing, archery, discus, shot put, hammer, javelin, cycling, golf, marksmanship and weight-lifting) often produced lower EMG levels, pre-, during- and post-action, than less successful athletes, in each respective sport, for the critical muscles: this finding was confirmed even in the case of boxing (arguably a semi-technical sport). Janson (1995) noted too that elite athletes show a markedly higher degree of synchronized attendance to agonist and antagonist to a much greater extent than those less skilful. Those observations were possible to replicate in a controlled study where athletes performing at international level were compared to athletes performing at national and club levels (Janson, Archer & Norlander, 2003).

As indicated, good timing is necessary for maximal sports performance, as both athletes and sports psychologists agree. The present study examines the views of certain athletes, belonging to the absolute elite, regarding timing and whether or not they use/have used particular techniques to achieve effective timing or whether they conceive of timing as an uncontrollable phenomenon (Jackson, 1995).

Method

Participants

Eight participants took part in the study, four male and four female subjects, with a mean age of 44.50 years (*SD* = 11.06). Participants in the present study represented the following sports: canoe, diving, swimming, ski marksmanship, ice-skating and marksmanship. Each participant belonged to the absolute world elite within his/her sport. They had been awarded a large number of World Championship medals; seven of these had been awarded Olympic Gold medals. Three

of the participants are still active athletes and the others were active between 1 and 26 years ago. Regarding birthplace and upbringing, three reported a rural background, two a small town, one a medium-sized town and two a large town. One of the participants had belonged to a small club, two to a medium-sized club, two others to a large club, and three reported that they trained mostly by themselves. Regarding education, one participant had completed only basic education, four High School educations and three Higher Educations.

Procedure

The participants were contacted by letter informing them how the study would be carried out, its purpose, who would carry out the study, how long each interview was estimated to take and total confidentiality for the whole of the interview material. They were informed also that the results would be published but their identities protected. Of the participants contacted only one was absent at the time of interview due to a coaching appointment outside Sweden. Throughout, a positive, interested and compliant response was forthcoming. Following telephone/email contact, a venue was arranged. The interview venue is an important part of the procedure. Thus, the participants decided exactly where the interview would take place: in their own home or in a 'neutral' environment. Consequently, the interviews took place in several different settings but it was essential that the participant had chosen the setting and felt comfortable there. Each interview took approximately 2 hours to complete.

Before each interview a questionnaire on background data was presented. In order to facilitate the interviews, some very open questions had been prepared although they were in most cases not followed. Typical questions could be: "What does 'timing' mean for you?, What do you think about when you hear the word 'Performance'?, What do you think about when you hear the word 'Motivation' in connection to performance and timing?" The respondents were allowed great freedom to engross themselves and make comments, new questions or thoughts. The purpose was to get them to think freely and make associations pertaining to their athletic performance and experiences of timing. At each interview tape recorders were used and these were completely acceptable for all the interviewees. After the interview, each participant was informed that s/he would be contacted when the interview material was ready, so that they could give their opinions on this. Following completion of the interviews, notes taken from the tape recordings were transferred word for word to 105 pages of printed raw data.

Method of analysis

The Empirical Phenomenological Psychological method, the EPP method (Karlsson, 1993), provided the essential analysis of the material. According to the EPP method, the material is analyzed in five steps:

Step 1. The experimenter reads the material several times until s/he has acquired a detailed understanding and feeling. These reading are carried out through strong focus upon relevant psychological phenomena but without any purpose of testing the eventual validity of any particular hypothesis.

Step 2. "Meaningful units" (Meaning Units or MU) are identified. The text is divided into smaller units whereby a MU is identified each time there occurs a shift in meaning content with regard to the phenomena under study. It must be noted that these units are not to be considered separate parts but rather integrated parts of the whole context.

Step 3. The MUs are translated in regard to their psychological content. The implicit parts of the text are rendered explicit. Here, the Responder's language is altered to a more scientific and abstract language that ought to be independent of any particular theoretical notions.

Step 4. The MUs are combined into categories that are described in the form of synopses, i.e. summaries of the categories obtained. These synopses may appear very different depending upon the phenomena that they purport to describe. The descriptions aim at "how" and "what" the phenomena occur/consist of.

Step 5. The categories may be combined to a general structure on condition that the process is achieved without loss of important meaning. Here, the Investigator may lay aside the empirical material and reflect at a more abstract level. The result of this analysis is presented in qualitatively different themes that may be explained and exemplified with reference to citations extracted from the empirical material.

Reliability and validity

A test of reliability (Norlander, Gård, Lindholm & Archer, 2003) was used whereby 10 out of the 33 categories were extracted randomly. Five MUs were then drawn randomly out of each of the ten categories. This material was assigned then to two independent judges. Their task was to distribute the 50 MUs into the ten categories. One of the judge's distribution showed a 78% agreement with that of the Investigator's categories whereas the other judge's distribution showed an 86% agreement. Thus, the total estimation of reliability was 82% which should be regarded as a good reliability score (Norlander, Gård, Lindholm & Archer, 2003; Pramling, Norlander & Archer, 2001; Pramling, Norlander & Archer, 2003). In order to deal with the issue of validity the respondents were sent their generated MUs that had been sorted under the thirty-three categories and asked to consider making alterations if they thought that the categories did not reflect in a proper way their own responses on performance and timing . None of them had any changes at all to offer. Nevertheless, several of the participants urged that the present study ought to emphasize the enormous psychological pressures to which they felt they had been exposed during the Olympic Games.

Results

The 33 categories that were derived from the analysis of the material are presented here. The number of meaningful units, MU, derived was 964. Under each respective heading a short explanation of the category is provided, followed by a few representative citations from the interviews.

1. When timing appears everything seems to fit (106 MUs)

All aspects of co-ordination must fit in motion, thought and time exactly when one is about to perform a task.

Examples: “Timing is for me when everything fits without having to think about it” / ”It is much easier to perform good results if my timing is right” / ”An unbelievably concentrated and tough job facilitates timing completely, it’s just there even if I feel exhausted and have pains ”

2. Concentration is the most important psychological factor (86 MUs)

Concentration is described as an essential condition for performance. It is critical that athletes develop the ability to concentrate upon the right things prior to a difficult task.

Examples: ”When I am concentrated days before an important competition I have difficulty mixing with outside sport” / ”I can never have good timing without having good concentration at the same time.” / “All interfering thoughts must be removed. Those must I avoid. It is the performance that is important”

3. Preparation, ’pepping-up’ and warm-up is highly important (77 MUs)

The basis for a good result is that one is very well prepared through well-planned and hard training. In this way are thoughts directed towards what will happen for a long time.

Examples: ”The brain controls the body. That is what I train for a long time. Already at the start of the season I mark the most important competitions. If the Olympics are the goal I train and adjust the brain upon that Championship” / “I must have everything prepared before a competition, nothing must be left to chance. I must have control of everything” / “Sitting down and thinking too much before the start soon feels bad. What one has to do one has done many times before. I have my plan and I know how I shall carry out the competition”

4. Develop methods for tackling problematic competitive situations (54 MUs)

Many situations and disturbances, amongst others one’s own negative thoughts, may burden individuals in the process of performing at level competition. There are many ways by which one may solve difficulties before and during competition.

Examples: ”If I am tired, e.g. due to a long flight or bad sleep before competition, I must mobilize my inner reverses” / “I usually divide up the competition into different parts and teach myself during training how I shall deal with tactical aspects, e.g. what to do at start, in the middle or at the end, the spurt” / “I can accept being beaten if I have performed well. The quality of the competition is higher if many are in good form, but it is more difficult to win”

5. This is how I want to feel in a competition (47 Mus)

Often it is positive to feel in good form. But there are individuals who perform maximally despite not experiencing the feeling of being in top form.

Examples: ”It is a good test already at the start of the competition if I’m in good form, whether the equipment works, how I perform on this arena, how the wind is blowing, if everything is working it is a wonderful feeling” / “If I have good rhythm which is important for me, I can await breaks in the wind” / “At the end of the competition, I count down and try to spurt, coupling in the autopilot”

6. The training schedule and plan are critical for a good result (46 MUs)

It is very clear how important it is to have a very good training lay-out, planning and thoroughly thought out strategies. In juveniles, discipline, with regard to development of technique, is very important, whereas veteran athletes alter their training to suit the competitive conditions.

Examples: Once I trained on unbroken terrain at maximum speed, up and down hills, through moss I just rushed forward, in this case it was about training of attitude than about the speed of getting me forward” / “If I feel that it’s heavy going, I still give maximum effort, just because it’s very tough is no obstacle to hard training” / “In my sport there was earlier more amount of training compared with now when one focuses on qualitative training”

7. One must be prepared for problems (45 MUs)
Athletes are often confronted by difficult mental/physical situations, e.g. tiredness. Thus, it is necessary that they are prepared for when these situations arise and have the right strategies for dealing with the problem.
Examples: ”One must be prepared for problems at the World Championship, for example the organizers had technical problems” / ”If I feel resistance from my body, it’s wrong now you must rest now, then I break off training instead of continuing for two hours” / ”There are always small failures, it is nothing that one can influence oneself”

8. Control should encompass preparations and situations around the competition, never in the execution itself or in the technical details (42)
Everyone answers that they want control over what happens around training and the competition. But none want to have conscious control of details in their technical execution.
Example: ”Control is something positive for me, what I get up in my head is that I shall have control over preparations before the competition” / ”Control is quite important for me, I’m a control-freak who commands the situation. The equipment must be ‘tip-top’ and everything around must be under my control, as much as necessary for an important competition, then it feels good” / “If I have bad control of any part it’ll go badly, I can never shirk with that, then it gets discovered”

9. Mental training is carried out according to one’s own models (40 MUs)
All of the champions applied mental training, but have developed their own models that they have placed complete trust in.
Example: ”I prepare myself mentally before a competition through successive mental repetitions of what I need to do ‘when-the-chips-are-down’” / “With regard to the mental training one must think right, normally there’s not much disturbance, but training mentally when alone is better, it feels good” / “Many technical details are part of mental preparation. That is what one looks for in the training of timing”

10. Mental steps in important competitions (40 MUs) Thoughts may run
away down a path counterproductive for performance. It is essential to return to the right mental outlook if thoughts are astray.
Examples: ”I usually think of a computer that has control/alt/delete, if I press these tangents the screen will be black, it’s a good image for ’zero-position, after that I load what’s there” / ”Sometimes I’m on the borderline of making a bad result, but it works out anyway, then I smile to myself and confess I’ve been lucky” / “If I’m behind then there’s a fight within me to produce what is necessary”

11. Nervousness before and during an important competition exists even for the most successful. That type of stress may influence the result in a positive direction (40 MUs)
Despite great arousal and nervosity those at the top still manage to give top performances when it’s necessary. The consensus is that one is extremely nervous before and sometimes during the competitions, but one succeeds very well anyway.
Examples: ”Long before the competition I was very nervous and went around worrying but after the competition it was hard to understand why I was so nervous” / ”I know that when I’ve got a bit into the competition I’m so nervous that it feels bad, but it works anyway” / ”Nervousness and fear of failure are feelings within me”

12. Bad timing can occur (40 MUs)
Even if it works well before the competition can timing be disrupted when most necessary.
Examples: ”I must really exert myself if it’s a day when my timing is only half-way good” / ”If timing is working badly I must take emergency measures” / ”If things are going badly I have to find my timing again, but it can be

difficult" / "In order to break a bad trend one has to be absolutely professional"

13. It is important to have a knowledgeable and understanding coach (35 MUs)
If one is to have a coach s/he has to be of absolute top class, otherwise it is just as well to be without one.
Examples: "Once in the USA my coach there asked me to go and see him, 'had I fooled around or …?' instead he said that he believed in me and that I ought to train my technique, if I did that I would break the world record, someone believed in me and was proven correct" / "Perhaps one doesn't think about it when one is standing there at the start line, but as coach I think one has to consider all the bits as a whole" / "My trainer has had great significance for my timing, I had to begin by learning the movements in slow motion"

14. It is important to get the right feeling (29 MUs)
Feeling is part of that 'wholeness' that is experienced as the basis of performance and the way to achieve good timing.
Examples: "One is charged with feeling somewhere" / "Right feeling involves only the mental" / "I've often started competing too early, tired myself out in the competition before it's even begun, it's necessary to have the right balance emotionally"

15. This is my way to carry out a competition (21 MUs)
Obviously, before an important competition the ways in which one prepares varies greatly. Each has his/her own way to 'pep up' or view different situations.
Examples: "I never think that I shall win, never at all, I do my best and try to get to the final, anything longer I never think of" / "I did the wrong things completely in the beginning of my career, it was a difficult lesson that had to be relearned" / "I took a break of two years from competition and then came back. During the break I was able to consider what I had done during the earlier years. After my 'come-back' I would give particular thought to execution before a competition"

16. To a great extent, training ought to be like the competition (21 MUs)
The best athletes, further forward in their careers, will carry out quality training that mimics competitive conditions as much as possible.
Examples: "I find it quite easy to envision myself into competitive situations during training" / "At training I want to create an experience of the body feeling that nervosity one gets at important competitions and then succeed with what I have set myself" / "In the USA I trained with the best in the world, that was very good"

17. More radical technique alterations should be carried out in younger years (21 MUs)
If more radical adjustments of technique are required, these should be done in younger years. But lesser adjustments, improvements and developments are maintained continually within the elite group.
Examples: "I have developed the whole time during my career and I have discovered small improvements the whole time" / "I have developed my technique myself, no-one has meant anything for me in that regard" / "Technique adjustments are made during training, never at competition"

18. Visualization is applied to arrive at the right feeling/flow before and during performance (19 MUs)
Examples: "It is my 'driving-thought' that steers everything" / "Visualization is about how I fantasize about how concordant it should in relation to the goal, OK, this is how, now to the next thing" / "If I have difficulties envisioning the goal, I perform badly"

19. Self-confidence is an important basis for good performance (19 MUs)
Self-confidence is a psychological factor that in retrospect may improve concurrently with harder

training and successes achieved as well as that others think one is able to achieve better performances.
Examples: ”If I don’t believe in myself I am hardly likely to attain timing either” / ”Good timing is good and I have good self-confidence and if self-confidence is bad then timing is bad too” / ”My self-confidence hangs together with good self-confidence”

20. Execution is taken care of unconsciously (16 MUs)
This is a part of performance difficult to explain and difficult to understand, that one may perform so many tasks unconsciously and without having complete control over what is happening.
Examples: ”I think the brain sees the goal but is not able to register it consciously (a very fast-moving sport)” / ”I use one or two words to engage the autopilot and that great feeling I want in the technique” / “I can perform well without seeing the goal”

21. The atmosphere within the whole team is important (15 MUs)
The team members and leaders ought to best understand what must be done and what services each individual requires to optimize performance. It seems likely that a sufficient degree of ‘pep-talk’ from colleagues is more valuable than that of others.
Examples: ”The team is working badly if one thinks ill of certain persons’ behavior,” / Co-ordination within the team work even if one was competiting singly, there are those who want to join closer to the competition, let them do so” / ”One agrees with the leader and the athlete how it should be done.”

22. Inspiration from the task is important for achieving a good result (13 MUs)
The consensus is that inspiration from the task is another factor contributing to top performance.
Example: ”One can hardly be 100% inspired at a small competition even if I’ve tried to get a good result, it can feel heavy sometimes at small competitions” / ”Inspiration must be present at training and competition to make it meaningful, that what I do is important” / ”Inspiration is there the whole time, for me it’s a question of attaining the right offensive puzzles bits that I want to think about”

23. Technique is well-rehearsed and works automatically in competitions where everything goes well (13 MUs)
The better the active athletes have become, the fewer changes in technique that have been made.
Examples: ”The technique has become part of me and my behavior, that has been ingrained over a very long period and is difficult to alter” / ”I am very careful that the technique is executed exactly as rehearsed” / ”The technique is in my backbone it very easy to compete when everything works”

24. I have not received any good coaching (11 MUs)
Several of the athletes have not had a regular coach. One is autodidactic to a very great extent.
Examples: ”I went through the whole junior stage completely with my own resources only” / ”I am self taught” / ”No coach can come to me and say this what you do today”

25. Motivation and attitude influence the will to train hard and compete (11 MUs)
Motivation appears to be so obvious a factor for most athletes they don’t even mention it.
Examples: ”Motivation is important” / ”I must have a competitive consciousness that carries me through the tough ’building-up’ training” / Others have said to me – ’What are you doing?’ – I must have something that drives me forward.”

26. Negative thoughts are to be avoided (11 MUs)
Without forethought, unwished-for thoughts may ’pop-up’ like a ’jack-in-the-box’
Examples: ”Thoughts can give a whole lot of problems” / ”During the competions I have tried to steer my thoughts

away from negative thinking" / "The thought can do something so that I become heavy in my movements."

27. Sometimes one must alter thinking to seek good timing (9 MUs)
In order to seek a way into good timing one must act.
Examples: "If I make several mistakes I can try and alter my thoughts, hardly after just a single mistake" / "I alter thoughts easily in order to get into good timing" / "When I seek good timing I change thoughts absolutely."

28. The translation of timing in the dictionary is completely correct (9 MUs)
The English "Timing" translates to time-adjustment, adaptation, adjustment and regulating.
Example: " The Definition fits exactly for me" / "The definitions in the dictionary apply for me, it is a confirmation that I am right, it's good to know" / "I can relate completely to the definitions."

29. In a competition thoughts must be strategic or not at all (8 MUs)
It appears to be important to consider the whole competition rather than details in order to get technical aspects to work.
Examples: "The more tired I am the shorter my planning. I just think fighting-to-the-last-drop" / "I need to have a thought strategy: I'll do my best" / "In the physical part of my sport I don't want to think of anything at all."

30. When everything works well all movements are smooth (6 MUs)
Within sport, when one refers to "smoothness" one implies that it is easy to execute the task and that on has less need for conscious thinking and steering of one's action. Most aspects 'run' by themselves and has luck on one's side.
Examples: "At the Olympics it was rigid at first, then later everything just worked" / "The best is when the competition just happens, then there is no time to think about anything but the competition" / "I try to avoid looking for problems and instead focus myself to try and find automatic executions again."

31. Timing can 'come-and-go' (5 Mus)
If one loses timing it can be difficult, but not impossible, to rediscover it again.
Examples: "If I become tired I can lose my timing" / "On a certain rare occasion during a competition one could awake suddenly and 'pick-up' good timing" / "I have never succeeded in executing a whole competition in which I retained that 'bubble-dream', for sooner or later it bursts, and unwelcome thoughts come in and then one reacts so that timing operates badly."

32. One must act in the right way if technique starts to be disrupted (5 MUs)
If one encounters a state in which technique is disturbed it is essential that the individual concerned returns to basic technique and in this way eventually corrects the deviation that may have occurred to 'competitive-stress'.
Examples: "Even if technique is working badly at a competition I never ruin everything, something works, but it was something else that happened" / "If I've been in the USA for training I come home well-trained but with slightly worse technique, that was corrected by my Swedish trainer" / "One lane can work well, whereas another not at all, everything can go wrong."

33. Thought, image and feeling should work together (4 MUs)
Examples: "The total co-ordination is important" / "Thought, image and feeling should all be present if good timing is to be achieved" / "All three functions have importance for me."

Discussion

All the participants in the study reported the necessity of maintaining the right "basic thoughts" when they were trying to perform at their absolute best. They did this in different ways,

each to his/her own. If one was to construct a model, on the basis of the present study, depicting how the participants have presented a collective understanding of what performance and timing may look like, the following illustration presented in Figure 1 may be considered.

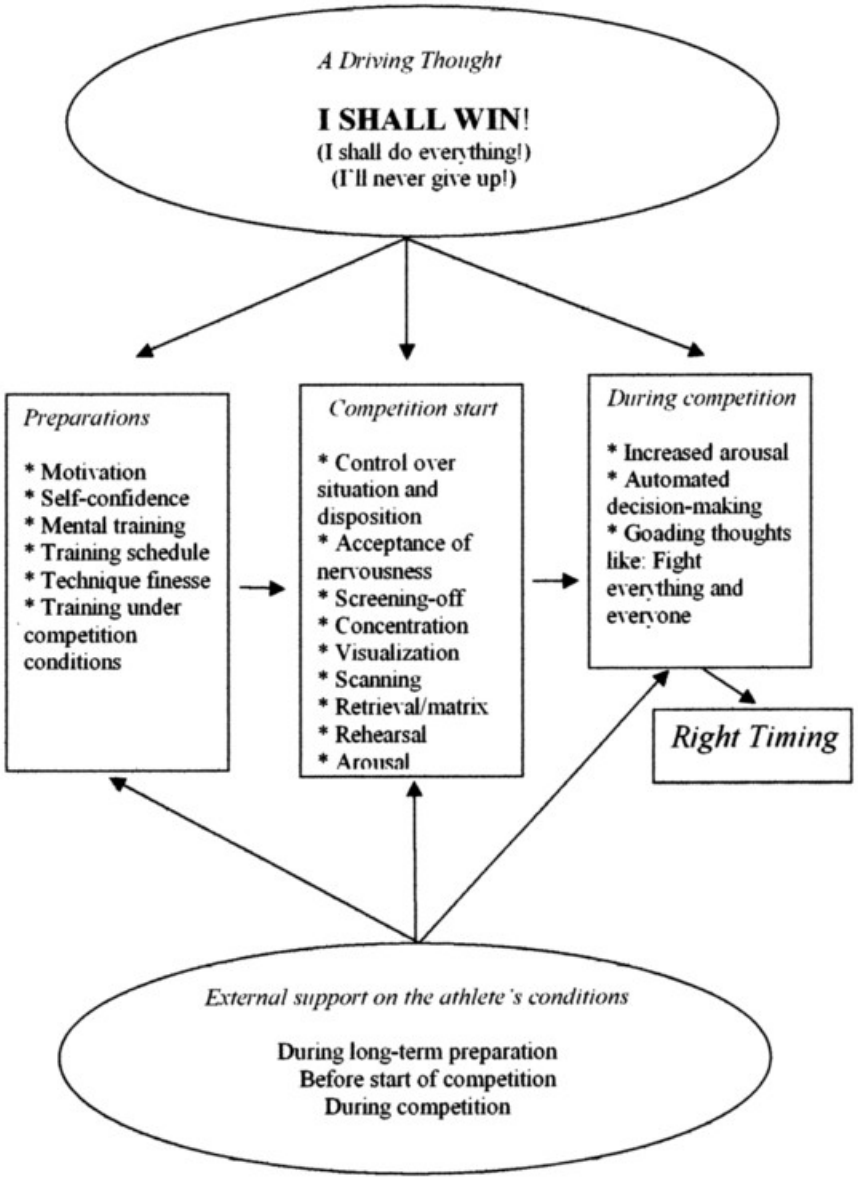

Figure 1. Model depicting the participants' notions of how the 'Right Timing' is achieved during performance.

Here, the results from the 33 categories have been formed into six main groups, or themes. This was done through independent reflections by each of the authors and the individual suggestions were thereafter compared and found to agree convincingly. After further discussions full consensus was reached concerning the themes and how they should be included in the

discussion section. The *first theme* indicates that there is a *unifying "driving" thought* that compels the top level athletes towards their goal. The *second theme* describes the preparations that forego the major task (a start in the Olympics). The *third theme* describes how one has executed the final preparations, just prior to start. The *fourth theme* explains how one has experienced the execution of the competition. The *fifth theme* describes something about how the athletes have experienced the coaching support that they have received. As a product of these five themes a good timing, during the performance at the competition, presents itself for the participants: this is the *sixth theme*.

The *first theme* covers two categories, according to the results section above (18 and 29). These categories may be described as a "*driving thought*", a form of trigger that through its compulsion drives the athlete towards his/her goal. One may describe here that the will to win is very strong. Thoughts like "I'll do it all" indicate that these athletes possess a great 'driving-force' that implements their victories. Under the categories 2, 3 and 4, the driving thought is always present, like a background sound, as one participant expressed it: "Somewhere in the brain the thought 'I shall do my best' always exists". In theme 3, the athletes describe how they reinforce the overriding thought through conscious, decisive and recurrent thinking about the "driving thought".

The *second theme* covers 8 categories (numbers: 3, 4, 6, 9, 16, 17, 19 and 25) that deal with the *long-term aspect of preparation* before important Championships. There exists an enormous amount of training invested by each of the male and female athletes participating in the study. The extent of this preparative work is described in the second theme by different categories. Physiological and psychological factors are noted both separately and in combination. These include motivation, self-confidence, nervousness prior to competition, mental training (mainly after their own fashion), the format of training, technical finesse, training under competition conditions and preparations. The "driving thought" provides the necessary motivation which is the fundamental requirement for athletes to train as hard as is demanded. This level of motivation is so strong that the athlete to greater exertion despite the time already spent and the pain experienced and that the results are not always satisfactory. The other categories within this theme are in their turn dependent upon motivation. All the factors comprising this theme pertain to the individuals' way of training and coping with the pressures that elite competion exert upon the absolute best athletes.

The *third theme* covered 6 categories (2, 8, 11, 14, 22, and 26) that may be summarized as the *direct mental preparation prior to start of competition.* Several of the participants consider it very important that their thoughts are strategically-oriented and most speak of *envisioning* what they expect will happen. In this context, it must be noted that concentration was considered the most essential psychological factor. This illustrates that at start the individual need absolute solitude, away from media, team managers and other acquaintances that may make the wrong comments at that time. Each participant had worked with his/her concentration to an inestimable extent over the years; most recognized the necessity of good concentration before even participating in their sport competively. Concentration may be interpreted in several ways, from 'narrow focus' to 'split vision', depending upon the particular task at hand. Mobilizing the 'right' concentration ensures too that negative thoughts are kept aside and unity with the "driving thought" is reinforced (theme 1). In the present study, all the participants describe the necessity of

‘concentration exercise’ as critical just prior to and during the competition, a procedure used to project an image of execution and/or accomplishment. The most desirable concentration is that with narrow focus, one that implies the absorption into oneself, *internal concentration.* This type of focus realizes a *scanning* of their bodies (the feeling of right level of tension), accomplishes a mental *retrieval* of correct execution, reminds them that they possess the right technique within themselves. Concurrently, one repeats mentally the sequences inherent to the competition, *rehearsal*, and the feeling so induced is essential for self-sufficiency just before start, a prerequisite for the desired *arousal* or *priming*, as opinions vary.

Some participants expressed a feeling of weakness just before start but nevertheless recover their ability when the competition has started, as appropriate feelings facilitate priming. Some form of ‘fighting-spirit’ is generated as the competition starts and this in turn initiates the technical ability. The awareness that they can perform well, despite the discomforts prior to start, generates this ‘fighting-spirit’. All detailed thoughts regarding technique and accomplishment must be abandoned just before start. All rehearsed-in technique, due to the massive training schedules, are established and underlie the implicit, unconscious execution of automated sequences. Some participants described themselves as being “empty-headed” but nevertheless imbued with ‘fighting-spirit’, on control questioning. One seeks a dominating, ‘driving-thought’ that induces the heightened arousal that facilitates performance over expectations.

All the participants sought control over situational aspects of the competition, i.e. schedules, coach departures, start-times, etc. Possessing more comprehensive control over the situation is considered to optimize the possibility of better timing. In a different context, Mack (1995) describes the importance, under emergency, of professions like police and fireman possessing knowledge of events. Possession of information concerning how things look at the ‘site’, what has occurred and prevailing conditions were ranked highest and it was concluded that knowledge of what will happen allows mental preparation and ensures a better job (Mack, 1995).

The *fourth theme* covers 10 categories (5, 7, 10, 12, 20, 23, 27, 30, 31 and 32) that describe the participants’ *experiences during performance.* It is now one needs good timing. If the components parts of the third theme work effectively most athletes postulate that they achieve increased possibilities to realize a natural feeling of flow (Jackson & Csikszentmihályi, 2000). However, not all athletes since the present ones implied that one may feel heavy and stiff before start and they could experience a great load, psychological and physical, during the initial stage of the competition. Despite these wearing periods, often throughout, it is remarkable that the competition is completed in the manner one applies. Normally, some sort of avoidance may be expected, breaking off or reducing the demands on oneself and performing worse. These top athletes seem to possess a strong ‘winner-instinct’ or ‘driving-thought’ that despite all setbacks during preparation and performance accept the discomforts to achieve the goal. Good timing may occur despite the ‘heavy’ feeling before or during competition: “Timing can come or go”, related one of the participants. A characteristic feature of the absolute best is that they never give up.

When thoughts, images, feelings and actions form a wholeness, one approaches the term, timing. Perfect timing may be attained even under great pressure and thinking constraints regarding risk of failure. The participants implied that even under these circumstances a good result may be achieved. One may attain good timing when under tough psychological pressure

and thereby perform well. The experience of Flow is, as this investigation suggests, *not* a prerequisite for such high level performance. This type of reasoning is necessarily to reach coaches and athletes at the highest levels.

The athletes remained quite relaxed in certain competitions but in others they were highly nervous. Young athletes may demonstrate great mental strength, since both their own and others expectations are low and failure a real possibility. With a moderate attitude they may go through the competition as a fine experience whereas later demands, stress and discomfort may alter the situation radically. The athletes in this study appear repeatedly to cope with the expectations and demands placed on them.

The study indicated that even though the best athletes may be afflicted by serious worry prior to and sometimes during the most important Championships, they are able to perform at the highest level. The participants seem never to have doubted in these situations. They never considered escape as "being something offered within oneself". It was established too the nervosity they experienced could be transformed to a force, an anger and motivation to be used for success as well as power and endurance; one chose always to struggle.

The *fifth theme* covers 4 categories (13, 15, 21 and 24) and concerns the *coaching and external support* that the participants had received. On one hand, this part enters generally long before the most important performances, on the other, it concerns the final preparations before start and for some of them even during the competition, through efforts of the coach and others. Team spirit appears as an important factor for good performance, as external support was critical for several. Team spirit was particularly important for the female participants (13 MUs for the female athletes as opposed to 2 for the male). Concurrently, category 15 indicates that the female athletes persisted with their own method to a much greater extent than the males: 19 MUs were obtained for the females persisting with their own method as opposed to 2 MUs for the males. This result was surprising given the observation by coaches that it was easier to instruct women whereas men were more difficult "for coaches to shape". Regarding 'coach-support', the study produced a large discrepancy between athletes. Some participants considered that the coach meant everything for them while others considered that they had received hardly any 'coach-support'. In the latter case, male participants expressed 9 MUs whereas only 2 MU such negative views emerged from the female participants. The distribution pertaining to coaches' contribution was unanimous: all the participants (in 35 MUs) expressed definitely that they desired a knowledgeable and understanding coach.

The *sixth theme*, *timing* (Categories 1, 28 and 33), emerges for the athletes if the five preceding themes can provide a functional basis. Category 1 provided the most MUs, 106, which is understandable since the study involved timing. Despite the multiplicity of responses with a diversity of individual variations it is remarkable that the subjects' responses display such agreement over what the concept entails, i.e. temporal setting, adaptation, adjustment and regulation.

There appear to be certain unifying factors underlying the uniquely successful performances of the eight athletes, studied here, at Olympic and World Championship level:

Firstly, all the participants described themselves as being extremely nervous before start and some even had discomfort during performance. These observations stand in contrast to a popular opinion that it is "wrong" to be nervous and worried, but are in agreement with aspects of stress research (Ekman & Arnetz, 2002), whereby nervousness and worry may be transformed to a facilitatory functional role through mobilization of the neuroendocrine systems involved in 'fight'. This notion implies that nervousness and worry may act to 'trigger' the conditions optimal for maximal performance.

Secondly, the concept of flow (Jackson & Csikszentmihailyi 2000) often described as a necessity for top performance seems rather to be a transient and pleasant feeling not essential for top performance. Several participants felt heavy and sluggish before start but, once started, both body and motivation functioned well, increasing as timing worked better. This could take place without the concurrent pleasant and comfortable feeling. One conclusion is that flow offers an 'added bonus' to the athlete while timing must be a prerequisite for maximal performance.

Thirdly, the participating athletes described an inner conflict between feelings, reactions and thoughts required to reach harmony with the "driving thought". When this is successful good timing emerges. A wrongful thought pattern may be devastating in these cases. Mental strength is acquired over many years and is integrated intimately with other factors contributing to performance. The participants reported that before and during important competitions the idea of 'fighting-to-the-last-drop' as the only possibility. This 'driving force', between problems and driving thoughts, appears to have a critical implication for their final result. Timing is not something that just occurs but rather an ability that emerges over many years of hard training and subjugation of thought processes to the special behavioral characteristics underlying execution, i.e. automatic decision-making and accomplishment dissociated from conscious control of technical details. The driving thought is highly personal and compelling, a prerequisite for top performance.

Forthcoming studies aim to identify characteristic features between those successful at the highest level and those producing excellent performances during training and lesser events but fail repeatedly at the highest level. The identification of further meaningful units may contribute insights to facilitate athletes' achievement of improved timing.

References

Adam, J. J., & van Wieringen, P. C. (1988). Worry and emotionality: Its influence on the performance of a throwing task. *International Journal of Sport Psychology, 19,* 211-225.

Aggelousis, N., Mavromatis, G., Gourgoulis, V., Pollatou, E., Malliou, V., & Kioumourtzoglou, E. (2001). Modifications of neuromuscular activity in performance of a novel motor skill. *Perceptual and Motor Skills, 93,* , 239-248.

Benvenuti, F., Stanhope, S. J., Thomas, S. L., Panzer, V. P., & Hallet, M. (1997). Flexibility of anticipatory postural adjustments revealed by self-paced and reaction-time arm movements. *Brain Research, 761,*, 59-70.

Bird, E. I. (1987). Psychophysiological processes during rifle shooting. International *Journal of Sport Psychology, 18,* 9-18.

Bood, S. Å., Archer, T., & Norlander, T. (in press). Affective personality in relation to general personality, self-reported stress, coping and optimism. *Individual differences Research,*.

Braathen, E. T., & Svebak, S. (1990). Task-induced tonic and phasic EMG response patterns and psychological predictors in elite performers of endurance and explosive sports. *International Journal of Psychophysiology, 9,* 21-30.

Buchman, A. S., Leurgans, S., Gottlieb, G. L., Chen, C. H., & Almeida, G. L. (2000). Effect of age and gender in the control of elbow flexion movements. Journal of Motor Behavior, 32, 391-399.

Ekman, R., & Arnetz, B. (2002). *Stress, molekylerna, individen, organisationen och samhället*. Stockholm: Liber.

Engelhorn, R. (1988). EMG and motor performance changes with practice of a forerarm movement by children. *Perceptual and Motor Skills, 67,* 523-529.

Harris, D. V., & Robinson, W. J. (1986). The effects of skill level on EMG activity during internal and external imagery. *Journal of Sport Psychology, 8,* 105- 111.

Hase, K., & Stein, R. B. (1999). Turning strategies during human walking. *Journal of Neurophysiology, 81,* 2914-2922.

Huebner, E. S., & Dew, T. (1995). Preliminary validation of the Positive and Negative Affect Schedule with adolescents. *Journal of Psycho- educational Assessment, 13,* 286-293.

Iwanowski, S. (1989). *Utprovning av adjektivchecklistan. Enheten för psykofysiologi.* [Testing the adjective checklist. Units or psychophysiology]. Solna, Sweden: Arbetsmiljöinstitutet.

Jackson S. A. (1992). Athletes in flow: A qualitative investigation of flow states en elite figure skaters. *Journal of Applied Sport Psychology, 4,* 161-180.

Jackson S. A. (1995). Factors influencing the occurrence of flow state in elite athletes. *Journal of Applied Sport Psychology, 7,* 138-166.

Jackson S. A. (1996). Toward a conceptual understanding of the flow experience in elite athletes. *Research Quarterly for Exercise and Sport, 67,* 76-90.

Jackson S. A. (2000). Joy, fun, and flow state in sport. In Y. L. Hanin (Ed.), *Emotions in sport* (pp. 135-155). Champaign, Il: Human Kinetics.

Jackson S. A., & Csikszentmihalyi, M. (2000). *Flow och idrott* [Flow in sports]. Transl. B. Berggren, & R. Fölsch. Jönköping, Sweden: Brain Books.

Jackson S. A., Kimiecik, J. C., Ford S., & Marsh, H. W. (1998). Psychological correlates of flow in sport. *Journal of Sport and Exercise Psychology, 20,* 358-378.

Janson, L. (1995). *Avspänd teknik* [Relaxed technique]. Stockholm: SISU.

Janson, L., Archer, T., & Norlander, T. (2003). Timing in sports performance: psychophysiological analysis of technique in male and female athletes. *Athletic Insight, 5 (4).* Retrieved December 15, 2003, from http://www.athleticinsight.com/Vol5lss4/Timing.htm

Janson, L. Archer, T. & Norlander, T (submitted). *Case Studies of Muscle Activity in Running.* Karlstads Universitet, Department of Psychology, SE-651 88 Karlstad, Sweden.

Karlsson, G. (1993). *Psychological qualitative research from a phenomenological perspective.* Stockholm: Almqvist & Wiksell.

Kercher, K. (1992) Assessing, subjective well-being in the old-old: the PANAS as a measure of orthogonal dimensions of positive and negative affect. *Research on Aging, 14,* 131-168.

Kjellberg, A., & Bohlin, G. (1974). Self-reported arousal: Further development of a multifactorial inventory. *Scandinavian Journal of Psychology. 15,* 285-292.

Kjellberg, A., & Iwanowski, S. (1989). *Sress/energiformuläret: Utveckling av en metod för skattning av sinnesstämning i arbetet.* [The Stress/arousal questionnaire: Development of a method for assessment of mood at work] Solna, Sweden: Arbetsmiljöinstitutet, (Undersökningsrapport 1989:26).

Mack, G. (1995) The M.A.P. for Salem Firefighters, NYC, USA

Nationalencyklopedins ordbok. (2000). *Nationalencyklopedins ordbok* Dictonary of the Swedish National Encyklopedia]. Höganäs, Sweden: Bra Böcker.

Norlander, T., Bergman, H., & Archer, T. (1999). Primary process in competitive archery performance: Effects of flotation REST. *Journal of Applied Sport Psychology, 11*, 194-209.

Norlander, T., Bergman, H., & Archer, T. (2002). Relative constancy of personality characteristics and efficacy of a 12 -month training program in facilitating coping strategies. *Social Behavior and Personality, 30*, 773-784.

Norlander, T., Bood, S. Å., & Archer, T. (2002). Performance during stress by different occupational groups: Affective personality, age and regularity of physical exercise. *Social Behavior and Personality, 30*, 495-508.

Norlander, T., Gård, L., Lindholm, L., & Archer, T. (2003). New Age: Exploration of outlook-on-life frameworks from a phenomenological perspective. *Mental Health, Religion & Culture, 6*, 1-20.

Pates, J., Oliver, R., & Maynard, I. (2001). The effects of hypnosis on flow states cand golf-putting performance. *Journal of Applied Sport Psychology, 13*, 341-354.

Pramling, N., Norlander, T., & Archer, T. (2001). Moral expression in six-to-seven year-old children's stories in Sweden, Hungary and China: A phenomenological study. *Childhood, 8*, 361-382.

Pramling, N., Norlander, T., & Archer, T. (2003). Conceptualization of the unknown by 6-, 9- and 14-year-old children: In search for a 'heffalump'. *Childhood, 10*, 379-392.

Russell, W. D. (2001). An examination of flow state occurrence in college athletes. *Journal of Sport Behavior, 24*, 83-107.

Rychtecky, A. (1978). Diagnostics of volitional effort of the sportsman in motorial activity. *International Journal of Sport Psychology, 9*, 176-190.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychology, 4*, 219-247.

Strauss, M., & Klich, R. J. (1999). Phrase context effects on lip EMG activity during vowel production in apraxia of speech. *Journal of Medical Speech Language Pathology, 7*, 145-153.

Varg, N. (1997) *Negativ affektivitets inverkan på svarsbeteende i enkätformulär.* [The influence of negative affect upon responses to questionaires]. Stockholm: Stockholms Universitet.

Watson, D., Clark, L., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect. The PANAS scale. *Journal of personality and Social Psychology, 54*, 1063-1070.

Williams, J. H., & Barnes, W. S. (1987). Temporal pattern of agonist-antagonist EMG activity during rapid limb movements in man. *Perceptual and Motor Skills, 65,* 933-934.

Wilson, K., Gullone, E: & Moss, S. (1998). The youth version of the positive and negative affect schedule: A psychometric Validation. *Behavior change*, *15,* 187-193.