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Title: The Multi-States (MuSt) Theory for Emotion- and Action-regulation in Sports

Year: 2021

Version: Accepted version (Final draft)

Ruiz, M. C., Bortoli, L., & Robazza, C., (in press). The multi-states (must) theory for emotion- and action-regulation in sports (pp. XX-XX).. In M. Ruiz & C. Robazza (Eds.). *Feelings in sport: Theory, research, and practical implications for performance and well-being.* New York, NY: Routledge.

Chapter 1: The Multi-States (MuSt) Theory for Emotion- and Action-Regulation in Sports

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Abstract

Feeling states - including emotional experiences - are fundamental to human adaptation, as they influence effort, attention, decision making, memory, and behavioural responses of individuals, as well as their interpersonal interactions. Thus, the ability to self-regulate is crucial for athletic success. This chapter presents the multi-states (MuSt) theory as a holistic approach for both emotion- and action-centred self-regulation for performance enhancement and optimization. Central to the MuSt theory is the notion that a combination of emotion- and action-regulation strategies is more effective than focusing on one aspect alone. In this chapter we describe psychobiosocial feeling states and core action components—the most relevant components of functional performance—as the targets for self-regulation. We then present guidelines for the identification, prediction, and regulation of optimal and dysfunctional psychobiosocial feeling states and core action components. Finally, we discuss avenues for future research and practical implications.

During the 2019 final of the tennis Grand Slam Roland-Garros, Rafael Nadal played against Dominic Thiem. Nadal won the first set 6-3, and lost the second set 5-7, with Thiem receiving a standing ovation from the public. Up until this point, Nadal had committed 12 unforced errors while had Thiem 7. After the second set, Nadal left the court and returned with a fresh set of clothes, wet hair, and changed bandana. He then won the next 16 of 17 points in the third set. He won the next two sets 6-1 and 6-1, and ended up winning the championship. It seems like what happened during that break was a turning point for Rafael Nadal who re-entered the court with renewed energy.

The ability to regulate one’s thoughts, emotions, and behaviours, especially in high pressure situations, is crucial for athletic success. How can athletes regulate their emotional and other feeling states to achieve or regain their optimal edge when needed? How can they regulate their task-execution to produce consistent performance? In this chapter, we describe key concepts for optimal emotion- and action-regulation in an attempt to provide answers to these questions. First, we present the multi-states (MuSt) theory, a holistic framework for self-regulation in a sporting context. We then describe the main targets for self-regulation: psychobiosocial states as the focus of emotion regulation, and core action components as the focus of action regulation. Next, we provide a stepwise procedure for the optimization of performance. Finally, we outline avenues for future research and practical implications.

The Multi-states (MuSt) Theory for Self-Regulation

The MuSt theory is here proposed as a holistic and integrative perspective to account for the variety of performance states athletes experience in training and competition. The MuSt theory is intended to describe and understand idiosyncratic performance experiences, predict performance, and identify the most effective emotion- and action-centred self-regulation strategies. The MuSt theory is conceptualized as a dynamic and multidimensional process that involves the interactions between individual, task, and environment, appraisals of perceived resources to manage task demands, emotion- and action-based self-regulation, and performance process and outcome. Central to the MuSt theory are: (1) the concept of psychobiosocial states, with emotion as a core component; (2) core action components; and (3) the notion that a combination of emotion- and action-regulation strategies is more effective than focusing on one aspect alone (see Robazza & Ruiz, 2018). The MuSt theory draws upon and develops ideas from the individual zones of optimal functioning (IZOF) model (Hanin, 2000, 2007), the multi-action plan (MAP) model (Bortoli, Bertollo, Hanin, & Robazza, 2012; Robazza, Bertollo, Filho, Hanin, & Bortoli, 2016), the identification-control-correction program (Hanin & Hanina, 2009), and the task execution design approach (Hanin, Hanina, Šašek, & Kobilšek, 2016). In particular, emphasis in the MuSt theory is placed on a dynamic process that extends (a) the IZOF model by including an action monitoring/control dimension in interaction with performance functionality, and (b) the MAP model by considering a wide range of psychobiosocial states. Individualized profiling procedures are fundamental in the identification of functional and dysfunctional psychobiosocial states and core action components of optimal performance, which are the basis for the regulation.

Psychobiosocial Feeling States

Feeling states, including emotional experiences, are fundamental to human adaptation, as they influence effort, attention, decision making, memory, and behavioural responses of individuals, and their interpersonal interactions. Within the IZOF model (Hanin, 2000), emotions are conceptualized as central components of performance-related psychobiosocial states, the performance process, and overall human functioning. Psychobiosocial states manifest themselves in emotional (subjective experience), as well as cognitive, motivational, volitional, bodily, motor-behavioural, operational, and communicative state modalities (Hanin, 2010; Ruiz et al., 2016). A comprehensive description of each state modality is presented elsewhere (e.g., Ruiz et al., 2016).

Emotional subjective experiences are conceptualized based on the interaction between valence (pleasant vs. unpleasant) and functionality (functional vs. dysfunctional) distinctions (see Figure 1, left lower side). Thus, some experiences can be unpleasant (e.g., feeling anxious) but helpful for performance by providing energy, while others can be pleasant (e.g., feeling satisfied) but dysfunctional, reflecting a lack of effort or complacency. Athletes’ experiences can be divided into state-like experiences (right-now feelings), trait-like experiences (typical patterns of experiences), and meta-experiences (experience about the experiences). For example, an athlete may have a tendency to feel anxious in competitions (pattern), and thus, experience high anxiety at a specific encounter (state). However, they may not accept such anxiety and feel that they should be relaxed (negative meta-experience of anxiety). The concept of meta-experience is critical for self-regulation. An effective implementation of regulation strategies requires an individual's awareness of state-like experiences and of their impact on performance. Afterwards, acceptance of these inner experiences is needed to self-regulate effectively (Hanin, 2007).

[INSERT FIGURE 1 HERE]

The MuSt theory shares with the IZOF model the notion of individual zones of optimal/non-optimal state intensities as related to performance. In the MuSt theory, this notion is extended to incorporate functional action components.

Core Action Components

Similar to the MAP model (Robazza et al., 2016), the MuSt theory claims that directing attention to a few 'core' components of the action helps the athlete execute a movement pattern within a functional range of variability, and therefore perform more consistently, particularly under pressure. Core action components are conceived as fundamental movements or action-related behaviours, such as 'positioning', 'grip', 'aiming', and 'timing', in precision sports (Bortoli et al., 2012), 'effort', 'acceleration', and 'rhythm' in endurance sports (Meijen, 2019), and visual information sources for pattern recognition and anticipation in situational sports (North & Williams, 2019). These core components are subjected to higher variability and accuracy fluctuations than automated technical elements, which are typically executed without conscious attention. Core action components are encoded and stored in long-term memory and determine the effectiveness of movement patterns. Their mental representations are idiosyncratic, and therefore differ widely among athletes. Focusing on core components is expected to enhance movement mastery and self-confidence in practice and competition.

Self-regulation strategies should involve regulation of feeling states as well as attention monitoring/control of core action components, resulting in a 2 × 2 × 2 interplay between action monitoring/control, valence, and performance functionality. These relationships are illustrated in Figure 1 (left side). Four performance types derive from the interaction between performance functionality and action monitoring/control (upper part), and the interplay between functionality and valence (lower part). These 2 × 2 × 2 relationships (right side) result in eight theoretically assumed performance related feeling states.

In Type 1 state, high-level performance is associated with little action monitoring/control and functional/pleasant states. In this flow-like state, usually triggered by a challenge appraisal, the attention focus is limited to ‘supervising’ the action. Task execution, which does not rely on working memory and controlled attention (Furley, Schweizer, & Bertrams, 2015; Furley & Wood, 2016), appears to be autonomous, effortless, smooth, consistent, and effective (Csikszentmihalyi, Latter, & Duranso, 2017; Harmison, 2006). The performer feels in complete control, confident, and full of energy. However, this highly self-rewarding psychophysiological state is rarely experienced, especially when sought after. Type 2 state, which is more frequently experienced, is also prompted by a challenge appraisal, and typified by higher action monitoring with effortful attentional focus voluntarily directed toward a limited number of action components (e.g., Vitali et al., 2019). Performers in this state report pleasant or unpleasant functional states experienced with novel problems, unexpected events, demanding tasks, strenuous physical activities, competitive stress, and other situational difficulties. To attain a Type 2 state, attention should be directed to previously identified core action components to prevent excessive attention reinvestment or distraction from task-relevant cues, and to ease the transition to a more autonomous execution.

Types 3 and 4 states arise from the perception of threatening situations under stress or unpredictable issues that cause task disruption or disengagement. In Type 3 state, the performer’s attempts to deal with situational demands or recover from underperformance lead to distraction from task-relevant cues, excessive reinvestment of conscious attention to the execution of automated skills, loss of energy, impaired movement fluidity and automaticity (Masters & Maxwell, 2008; van Ginneken, Poolton, Masters, Capio, Kal, & van der Kamp, 2017). Performers usually report dysfunctional/unpleasant states. Finally, Type 4 state features low task engagement, low energy spent to goal-directed behaviours, and unfocused attention. Pleasant emotional experiences accompanying poor performances may be triggered by insufficient awareness or unstructured meta-experiences. For example, an overconfident athlete may overestimate the current situation appraising gain (victory) before the competition ends, and therefore may mobilize less energy or resources than those needed to accomplish the task. Another athlete may feel relieved from competition pressure after making a mistake s/he perceives diminishing the chance to win, and thus may decrease effort or engagement in the activity. Beyond these four performance states, and the eight feeling states emerging from the 2 × 2 × 2 (monitoring/control × valence × performance functionality) interplay, athletes experience a range of finely tuned patterns of performance states in attempts to adapt to or deal with situational demands.

Self-regulation Process

The MuSt theory process for self-regulation is depicted in Figure 2. In this process, the notion of individual appraisal is central, similar to existing theoretical views, such as the biopsychosocial model (Blascovich, 2008), the theory of challenge and threat states in athletes (Jones, Meijen, McCarthy, & Sheffield, 2009; Meijen, Turner, Jones, Sheffield, & McCarthy, 2020; Uphill, Rossato, Swain, & O'Driscoll, 2019), and the cognitive-motivational-relational theory (Lazarus, 2000). Positive (i.e., challenge) and negative (i.e., threat) appraisals are motivational states that depend on one's evaluation of anticipated benefits and harms in relevant person-environment transactions (Lazarus & Folkman, 1984) considering situational demands and personal resources. A positive appraisal reflects enough perceived personal resources to manage task demands, whereas a negative appraisal occurs when task demands are perceived as exceeding personal resources (see also Sammy, Harris, & Vine, 2020). Environmental factors, task demands, and personal characteristics are interactive determinants of individual appraisals, and are also critical for skill acquisition and development of sport expertise (see Renshaw, Davids, Newcombe, & Roberts, 2019). Environmental factors comprise both the location characteristics in which performance takes place (e.g., surface, climate, wind, altitude, affordances, constraints) and the social environment (e.g., teammates, coach, parents, spectators), while task demands depends on the characteristics of the skills (e.g., closed and open, self-paced and externally-paced) and type of sport (e.g., individual and team, short and long duration). Personal characteristics encompass, among others, individual motor skills, physical capacities, experience, personality traits (e.g., perfectionism, optimisms, mental toughness, emotional intelligence, sensation seeking, self-efficacy, confidence; e.g., Mosley & Laborde, 2016), preferences for emotional experiences (e.g., feeling tranquil, anxious, angry), attitudes toward action monitoring/control (e.g., external and internal attentional focus, flow experiences, clutch states; e.g., Swann, Crust, & Vella, 2017), and spontaneous or acquired self-regulation skills.

[INSERT FIGURE 2 HERE]

A positive appraisal is expected to lead to either pleasant or unpleasant functional states and high or low action monitoring levels. In a functional state, the athlete can ‘fluctuate’ among pleasant and unpleasant states and levels of action monitoring depending on the situation. The possible transition among states is indicated by the circular-dashed arrow in Figure 2 at the intersection of action monitoring, valence, and performance functionality axes. Rather than shifts among opposing categories, transition should be viewed as a continuum among multiple states underpinned by different levels of pleasant/unpleasant experiences and high/low action monitoring conditions. Competitive pressure, perception of challenge, fatigue, and/or unexpected events can determine changes from pleasant to unpleasant functional states and from low to high levels of action monitoring to manage external and/or internal demands and adapt to the situation. These functional states can reinforce a positive appraisal and exert beneficial effects toward performance process and outcome. In contrast, competitive stress, threat perception, exhaustion, and unpredictable events can determine an imbalance between perceived demands and personal resources. The resulting negative appraisal is conducive to dysfunctional states, which can be mostly unpleasant, and step-by-step control of action rather than action monitoring. Fluctuations occurring among hedonic valenced states and levels of action control are pointed out by the circular-dashed arrow (Figure 2, lower part). Again, transition among different levels of valenced experiences and action control is conceptualized as a continuum. Dysfunctional states can further enhance a negative appraisal of the situation and eventually result in detrimental effects on the performance process and outcome.

Performers can move not only among a range of functional states and action monitoring levels or dysfunctional states and action control levels, but also from a functional state to a dysfunctional state and vice versa (Figure 2, double-headed dashed arrow) in function of the unfolding events and related appraisal changes. A combination of emotion- and action-centred self-regulation strategies is therefore recommended to remain within optimal performance conditions across multiple states (large circular arrow in the upper part of Figure 2), or to regain optimal performance (solid arrow).

Applied Recommendations

According to the MuSt theory, the step-wise procedure for performance enhancement self-regulation involves: (a) identification of psychobiosocial states and core action components to enhance awareness, (b) prediction of performance and acceptance of the individual's states, and (c) use of self-regulation strategies. To illustrate this procedure, the experience of a 27 year-old male elite archer is briefly described. In this case, Steve (pseudonym) requested counselling to deal with competitive pressure and to improve performance.

Identification of Psychobiosocial States and Core Action Components

The identification and description of idiosyncratic performance experiences is based on individualized profiling of both psychobiosocial states (e.g., Ruiz, Hanin, & Robazza, 2016) and action components (Bortoli et al., 2012). With the help of a practitioner, athletes recall successful past performances and identify the content and intensity of their functional and dysfunctional states. Next, they are guided to become aware of idiosyncratic movement patterns underlying effective and ineffective task executions, and to identify the most influential core action components, those that differentiate optimal from suboptimal performance. Then, they rate the level of execution accuracy in their action components. The same procedure is repeated for their least successful past performances.

In the case of Steve, he was firstly presented a stimulus list of psychobiosocial states (see Appendix 1). This list is an extended version of the individualized profiling proposed by Ruiz et al. (2016). Using a retrospective method, Steve selected functional and dysfunctional state descriptors that best represented frequently occurring personal experiences, recalled optimal and suboptimal performances, and rated their intensities using a modified Borg's Category Ratio scale (CR-10; Borg, 1998). Steve was then asked to describe a personally relevant sequence of actions (from start to finish) needed for the most effective shooting execution. Identified action components were rated in terms of execution accuracy as related to optimal and suboptimal performances using the CR-10 scale (see Figure 3).

[INSERT FIGURE 3 HERE]

In a second step, Steve identified most critical functional and dysfunctional states and core action components, which clearly differentiated optimal and suboptimal performances under pressure. The key question was: 'Imagine yourself performing in a challenging situation, or in a mental or physical nonoptimal state, for example when you are under stress or fatigued, after a mistake, or a poor execution. What are the functional emotions and their related manifestations that you need to self-regulate in order to maintain or regain good performance and execute in a consistent and accurate manner?' The same question was asked to identify dysfunctional psychobiosocial feeling states. Finally, the following question was asked to identify core action components: 'What are the actions or behaviours that you need to self-regulate…?'

Steve selected 'secure' (Confidence modality), 'nervous' (Anxiety), and 'energetic' (Bodily) as core functional psychobiosocial states to be upregulated (i.e., increased in intensity). In the athlete's perception (i.e., meta-experience), a high level of nervousness was needed to be energetic. 'Worried' (Anxiety modality) was again selected together with 'unstable-performance' (Operational) as a dysfunctional state to be downregulated (i.e., decreased in intensity). A high level of worry was perceived as a main cause for unstable performance. Interestingly, nervous and worried as descriptors of the Anxiety modality were experienced as having opposite effects on the performance process (i.e., energy or performance instability). Regarding the action, Steve chose 'aiming', 'feeling relaxed', and 'timing' as core components. Communicative and Social support modality levels did not differ across optimal and nonoptimal performances, and therefore Steve did not need to regulate these modalities. In contrast, intensity levels of the identified core psychobiosocial states showed greater differences.

Similarly, accuracy levels of the selected core components were largely different across performances.

Prediction of Performance

The recall (retrospective) method to develop the individual profile of Steve was revised and refined regularly in combination with a direct (empirical) assessment. This involved a longitudinal assessment of psychobiosocial state intensity and core components accuracy before or after several competitions, and their correspondence with actual performance process and outcome levels. The MuSt theory advocates that individual profiles based on recalled and direct assessments allow predicting performance. Successful performance is predicted when the intensity of functional states and execution accuracy of action components are close to the individual's optimal intensity/accuracy levels, and dysfunctional states intensities and accuracy levels of action components are distant from nonoptimal ranges. This 'in-zone' condition is typified by maximum enhancing and minimum impairing effects. In contrast, poor performance is expected with intensities and accuracy levels near dysfunctional states and far from functional states. This 'out-of-zone' condition is characterized by high inhibitory and low enhancing effects. Intermediate performance outcomes are expected in a mixed condition, namely, when some state intensities and/or action component accuracy levels are closer to optimal states while others are closer to nonoptimal states. These predictions were verified and confirmed based on Steve's experience and performance.

Self-regulation

To reach and remain in the in-zone condition, athletes can apply emotion- or action-centred self-regulation, or a combination of the two strategies. Based on psychobiosocial states and action core components profiling, as well as performance predictions, Steve was encouraged to identify and apply emotion-centred self-regulation strategies (e.g., self-talk, arousal regulation, and imagery; Vealey & Forlenza, 2015; Williams, Zinsser, & Bunker, 2015) to enhance feelings of confidence, functional anxiety, energy, and reduce feelings of worry. He was also recommended to use action-centred self-regulation by directing attention to his three core components of the action.

Conclusions

In summary, according to the MuSt theory athletes experience a wide range of performance states in practice and competition originating from the action monitoring/control and functionality/valence interplay. To consistently reach and maintain optimal performance states, and recover from transitory performance drops, athletes can focus on their core functional states and core action components depending on current needs and situational demands. At first, performers should be helped to appraise the competition as challenging rather than threatening (Hase, O’Brien, Moore, & Freeman, 2019). This can be accomplished by improving their skills, ability, and knowledge and, consequently, their self-efficacy and perceived control, as well as by reframing or restructuring their thoughts, beliefs (Williams et al., 2015), and psychobiosocial reactions. Assessing and revisiting regularly individualized profiles of feeling states and action components can facilitate reappraisal, increase individual awareness of own responses to the competition, and enhance confidence and sense of agency. Furthermore, attending to core states and action components can help the performer focus on and mindfully accept the present moment situation rather than wasting energies in the struggle to exert control over the situation and own action (see Fink & Ruiz, 2020). In a mindful state, athletes are more prone to effectively apply emotion-centred and action-centred self-regulation to enter and remain in an optimal performance state and enjoy the experience.

The MuSt theory tenets here proposed may seem speculative. However, they are mainly rooted in the IZOF model (Hanin, 2007), the identification-control-correction program (Hanin & Hanina, 2009), the task execution design approach (Hanin et al., 2016), and the MAP model (Bortoli et al., 2012; Robazza et al., 2016), which have received substantial empirical support (see Robazza & Ruiz, 2018; Ruiz, Raglin, & Hanin, 2017). A number of additional views share interesting commonalities with the MuSt theory including, among others, the biopsychosocial (Blascovich, 2008), challenge and threat (Jones et al., 2009, see Sammy et al., 2020), dual-process (Furley et al., 2015), flow and clutch (Swann et al., 2017), integrative cognitive affective motor neuroscience (CAM) model (Hatfield, 2018), motoric (Carson & Collins, 2016, see Carson & Collins, 2020), and attentional control (Eysenck & Wilson, 2016) models. Thus, future research is necessary to: (a) test the specific predictions stemming from the MuSt theory; (b) investigate similarities, differences, and specific contributions in comparison with other theoretical views; and (c) examine the effectiveness of emotion- and action-centred self-regulation strategies separately and in combination.

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Figure 1. A multi-states (MuSt) theory representation deriving from monitoring/control, functionality/valence, and performance level interactions.

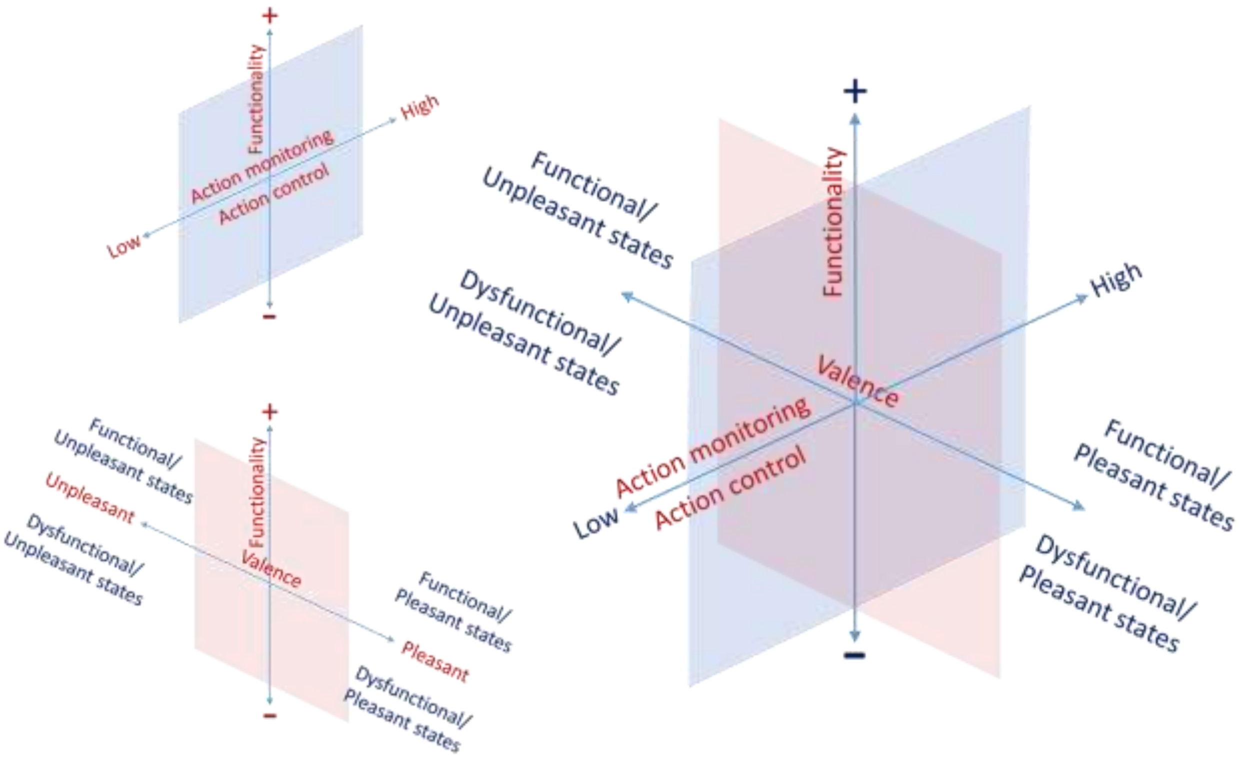


Figure 2. The multi-states (MuSt) theory and the self-regulation process.

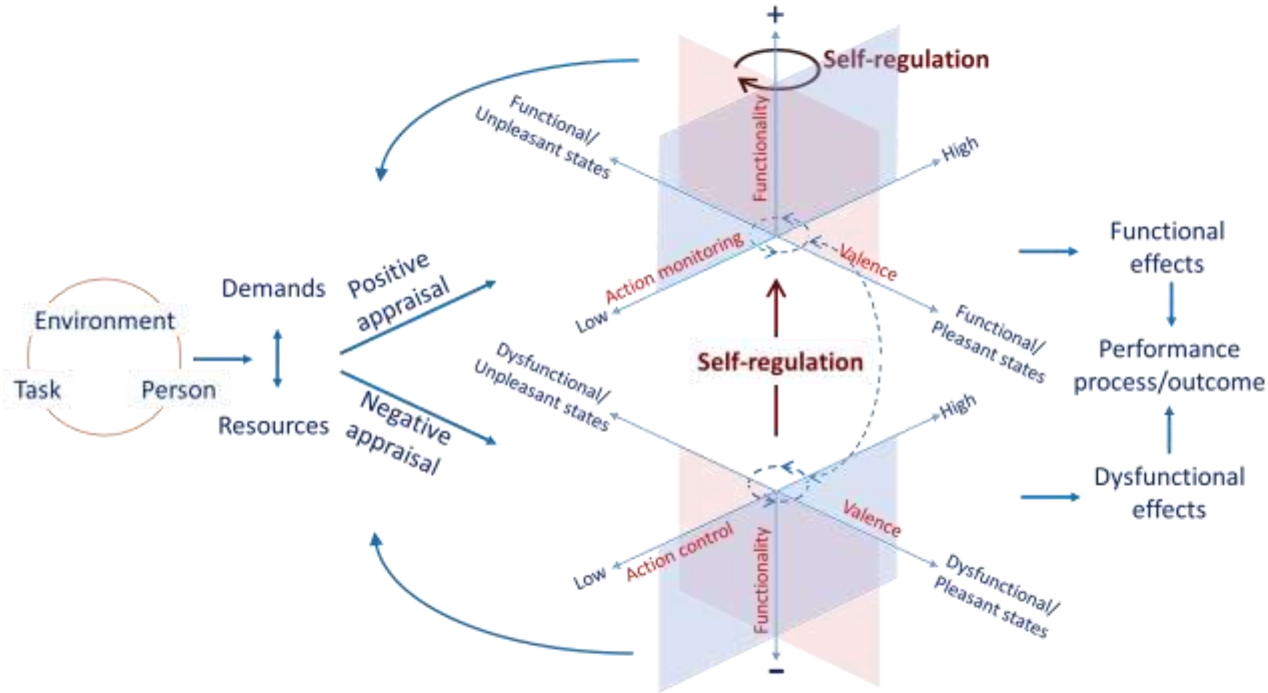
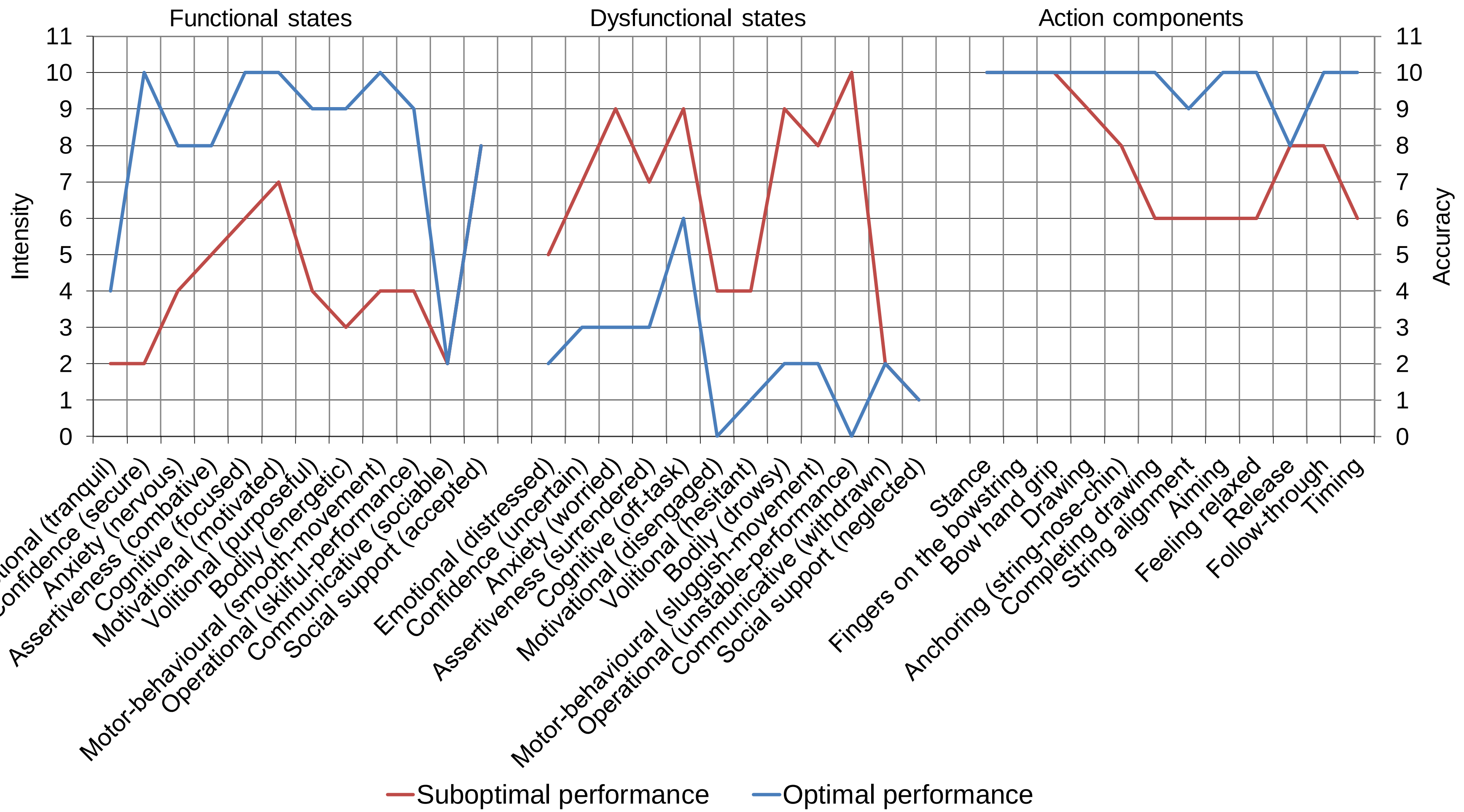


Figure 3. Individualized profile of an archer during recalled optimal and suboptimal performances. The archer’s selected descriptors of each functional and dysfunctional state modality are in parentheses



Appendix 1

Individualized Multidimensional Profiling of Psychobiosocial States

Below are labels that athletes use to describe their performance-related experiences. Read carefully all descriptors in each row and circle the one that describes best how you feel. Then, rate the intensity according to the following scale: 0 = nothing at all; .5 = very, very little; 1= very little; 2 = little; 3 = moderate; 5 = much; 7 = very much; 10 = very, very much; • = maximal possible.

1.	Enthusiastic, happy, joyful, cheerful, tranquil, calm	0	.5	1	2	3	4	5	6	7	8	9	10	•
2.	Fighting spirit, fierce, aggressive, combative	0	.5	1	2	3	4	5	6	7	8	9	10	•
3.	Active-, coordinated-, dynamic-, smooth-movement	0	.5	1	2	3	4	5	6	7	8	9	10	•
4.	Distracted, off-task, inattentive, unfocused	0	.5	1	2	3	4	5	6	7	8	9	10	•
5.	Effective- skilful- stable- consistent-performance	0	.5	1	2	3	4	5	6	7	8	9	10	•
6.	Uncommunicative, withdrawn, disconnected	0	.5	1	2	3	4	5	6	7	8	9	10	•
7.	Anxious, worried, tense, nervous	0	.5	1	2	3	4	5	6	7	8	9	10	•
8.	Abandoned, ignored, neglected, rejected	0	.5	1	2	3	4	5	6	7	8	9	10	•
9.	Vigorous, energetic, charged, rested	0	.5	1	2	3	4	5	6	7	8	9	10	•
10.	Sluggish-, uncoordinated-, clumsy-, weak-movement	0	.5	1	2	3	4	5	6	7	8	9	10	•
11.	Alert, on-task, attentive, focused	0	.5	1	2	3	4	5	6	7	8	9	10	•
12.	Unmotivated, uninterested, disengaged, uninspired	0	.5	1	2	3	4	5	6	7	8	9	10	•
13.	Dejected, unhappy, sad, distressed, upset	0	.5	1	2	3	4	5	6	7	8	9	10	•
14.	Ineffective-, unskilful-, unstable-, inconsistent-performance	0	.5	1	2	3	4	5	6	7	8	9	10	•
15.	Communicative, sociable, expansive	0	.5	1	2	3	4	5	6	7	8	9	10	•
16.	Purposeful, decisive, persistent, determined	0	.5	1	2	3	4	5	6	7	8	9	10	•

17. Unconfident, incapable, insecure, uncertain	0	.5	1	2	3	4	5	6	7	8	9	10	•
18. Motivated, interested, inspired, engaged	0	.5	1	2	3	4	5	6	7	8	9	10	•
19. Fatigued, tired, drained, drowsy	0	.5	1	2	3	4	5	6	7	8	9	10	•
20. Timid, fragile, reserved, surrendered	0	.5	1	2	3	4	5	6	7	8	9	10	•
21. Hesitant, indecisive, undetermined, irresolute	0	.5	1	2	3	4	5	6	7	8	9	10	•
22. Confident, capable, secure, certain	0	.5	1	2	3	4	5	6	7	8	9	10	•
23. Assisted, considered, supported, accepted	0	.5	1	2	3	4	5	6	7	8	9	10	•

Modalities: Row 1 = Pleasant states (+); 2 = Assertiveness (+); 3 = Motor-behavioural (+); 4 = Cognitive (-); 5 = Operational (+); 6 = Communicative (-); 7 = Anxiety (+ or -); 8 = Social support (-); 9 = Bodily (+); 10 = Motor-behavioural (-); 11 = Cognitive (+); 12 = Motivational (-); 13 = Unpleasant states (-); 14 = Operational (-); 15 = Communicative (+); 16 = Volitional (+); 17 = Confidence (-); 18 = Motivational (+); 19 = Bodily (-); 20 = Assertiveness (-); 21 = Volitional (-); 22 = Confidence (+); 23 = Social support (+).

Appendix 1