

## **THE UNDERLYING STRUCTURE OF EMOTIONS: A TRI-DIMENSIONAL MODEL OF CORE AFFECT AND EMOTION CONCEPTS FOR SPORTS**

**Alexander T. Latinjak**  
**Universitat de Girona, Catalonia, Spain**

**ABSTRACT:** This paper presents a theoretical approach to a new tri-dimensional model of core affect and emotion concepts. Former models (e.g., Russell, 1980) have placed specific emotion concepts along a circumplex model of core affect defined by two basic dimensions: Arousal, which ranges from high to low, and Valence, which varies from positive to negative. In order to cope with the problem of overlapping emotion concepts inside these models, a third dimension, namely Time Perspective, has been added. Using all three dimensions, it was possible to place 20 specific emotion concepts inside the tri-dimensional model. However, there are several considerations to be taken into account with this new model, such as the essence of core affect, the simplistic nature of the model and the way this model fits into current sport psychology literature. Overall, this model might not only offer a conceptual framework for future research, but it could also be a useful tool for applied sport psychology.

**KEYWORDS:** Emotions, Sports, Anxiety, Anger

### **LA ESTRUCTURA SUBYACENTE A LAS EMOCIONES: UN MODELO TRIDIMENSIONAL DE AFECTO BASE Y DE CONCEPTOS EMOCIONALES EN EL DEPORTE**

**RESUMEN:** En este trabajo se presenta una aproximación teórica a un nuevo modelo tridimensional del afecto base y de los conceptos emocionales. Los modelos anteriores (e.g., Russell, 1980) han emplazado conceptos emocionales en un modelo circular definido por dos dimensiones: Activación, que varía entre alta y baja, y Valor, que varía entre positivo y negativo. Para poder resolver el problema de los conceptos emocionales solapados en el modelo, se ha añadido una tercera dimensión: la perspectiva temporal. Con ayuda de las tres dimensiones, ha sido posible ubicar 20 conceptos emocionales dentro del modelo. No obstante, hay diversas consideraciones

acerca de este nuevo modelo que se han de tener en cuenta, como es la esencia del afecto base, la naturaleza simple del modelo y el lugar que ocupa en la literatura de la psicología del deporte. Todo en todo, este modelo podría no sólo aportar un marco conceptual para futuras investigaciones, sino que podría también ser una herramienta útil para la psicología aplicada del deporte.

**PALABRAS CLAVES:** Emociones, Deportes, Ansiedad, Cólera

### **A ESTRUTURA SUBJACENTE ÀS EMOÇÕES: UM MODELO TRIDIMENSIONAL DOS AFETOS E EMOÇÕES NO ESPORTE**

**RESUMO:** Neste trabalho se apresenta uma aproximação teórica à um novo modelo tridimensional dos afetos e emoções. Os modelos anteriores (e.g., Russell, 1980) situaram as emoções em um modelo circular definido por duas dimensões: ativação, que varia entre alta e baixa, e valor, que varia entre positivo e negativo. Para poder resolver o problema dos conceitos emocionais esquecidos neste modelo se há adicionado uma terceira dimensão: a perspectiva temporal. Com essas três dimensões foi possível identificar 20 emoções dentro do modelo. Não obstante, há diversas reflexões sobre este novo modelo que há que se considerar, como a essência do afeto, a natureza simples do modelo e o lugar que ocupa dentro da literatura da psicologia do esporte. Desta maneira, este poderá não somente aportar um marco conceitual para pesquisas futuras, bem como ser uma ferramenta útil para a psicologia do esporte aplicada.

**PALAVRAS CHAVE:** Emoções, Esportes, Ansiedade, Cólera.

In sports, participants experience a wide range of emotions during its practice (Hanin, 2000). As a result of this, previous research in sport psychology has focused intensively on measuring emotions in order to describe them and reveal their antecedents and consequences. A review of sports psychology literature conducted by Jones, Lane, Bray, Uphill, and Catlin (2005) concluded that there were two types of measures used: individualized measures (e.g., Hanin & Syrjä, 1995) which are able to “capture the idiosyncratic nature of the emotional response to competition by generating content relevant to each athlete” (p.408) and group orientated measures that are good for theory testing and synthesizing data across different studies. The latter can be further divided into single emotion measures (e.g., measuring competitive anxiety [CSAI-2: Martens, Burton, Vealey, Bump, & Smith, 1990]) and non-specific scales (e.g., measuring anxiety, anger, dejection, excitement and happiness [SEQ: Jones et al., 2005]).

By employing both types of measures, research has pointed out a series of antecedents of typical emotion episodes: Firstly, they gathered evidence regarding personal antecedents, such as (a) an athlete's attributions (e.g., Allen, Jones, & Sheffield, 2009), (b) coping strategies (e.g. self-talk [Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011] or music listening [Bishop, Karageorghis, & Loizou, 2009]), (c) psychological basic needs (e.g., Quested & Duda, 2010) or (d) self determined motivation (e.g., Standage, Duda, & Ntnoumanis, 2005); Secondly, they also studied situational antecedents, such as (a) the motivational climate (e.g. Torregrosa et al., 2010), (b) coaches' behavior (e.g., Edmunds, Ntnoumanis, & Duda, 2006; Torregrosa, Sousa, Viladrich, Villamarín, & Cruz, 2008) or (c) performance outcomes (e.g., Allen et al., 2009).

With regard to the consequences of typical emotion episodes on sport performance, positive emotions such as hope (Woodman et al., 2009) or excitement (Vast, Young, & Thomas, 2010) facilitated *good* performance, whereas negative emotions, such as anxiety (Scanlan, Babkes, & Scanlan, 2005) or dejection (Vast et al., 2010), led to *poor* performance. In addition to this, several authors have made reference to possible mechanisms through which emotions influence performance (e.g., Hanin, 2000; Jones, 2003), an example of which are changes in motivational aspects and physical and cognitive functioning (for a review see, Jones, 2003). Nonetheless, researchers in this domain have also pointed out the importance of the athlete's subjective interpretation in respect to the emotion's effect on performance (Hanin, 1997, 2000). Hence, negative emotions, such as anxiety and anger, can also precipitate *good* performance and positive emotions, such as joy and hope, can precipitate *poor* performance if they are interpreted as facilitative and debilitating respectively, by the athlete (Martinet & Ferrand, 2009).

### **Core affect and emotion concepts: a dimensional approach**

Most researchers have approached the study of emotions from a *basic emotion theory* point of view (Russell, 2009), that is the assumption that there is a small number of qualitatively distinct types of emotion (e.g., anger and fear). According to Russell, the main underlying problem of this approach is the scientists struggle to answer the popular question *What are emotions?* In order to resolve the problem researchers had defining the concept *emotion* in scientifically, Russell employed the term *core affect* (Russell, 1980, 2005). On the one hand, he argued that emotion is more a culture specific and vague folk concept, which, nevertheless, refers to real and important events (see also, Frijda, 2008). On the other, he defined core affect as a "pre-conceptual primitive process, a neurophysiologic state, accessible to consciousness as a simple non-reflective feeling: feeling good or bad, feeling lethargic or energized" (Russell, 2009, p. 1264). In order to describe the structure of core affect, he proposed a two-dimensional circumplex model using a pleasant-unpleasant and an activation-deactivation dimension as basic building

blocks (Russell, 1980). Although he considers two dimensions, both converge in an individual's subjective experience as a single feeling. The main difference between emotion and core affect is that emotions are described as limited in time while core affect is said to be continuously varying in the range of its dimensions (for a review see, Russell, 2009). Russell's (2005) proposition therefore, was "that emotional life consists of the continuous fluctuations in simple primitive feelings called core affects" (p.27). Lastly, core affects might precipitate perceptual, cognitive and behavioral patterns which can be recognized consciously as emotion concepts through psychological construction.

In line with Russell (2009), *psychological construction* is an umbrella term that comprises several processes that produce a particular emotional episode's components (e.g., non-verbal communication, emotional behavior or emotion regulation). Moreover, through psychological construction the individual associates these components and categorizes their pattern as a specific emotion concept. Thus, an *emotion concept* can be defined as mental representations of emotions' antecedents, psycho-physiological foundations and behavioral correlates (Niedenthal, 2008). A previous perspective in psychology was founded on the premise that emotion concepts were based upon basic dimensions, such as arousal and valence (i.e., pleasant-unpleasant). When postulating a theoretical approach, based on Russell's (1980) two-dimensional approach, theorists and researchers have emplaced specific emotion concepts in the model of core affect (e.g., Larsen & Diener, 1992; Russell & Barrett, 1999; Watson & Tellegen, 1985). An example of this is Russell and Barrett (1999) who used 16 emotion concepts in relation to the four quadrants defined by the combinations of both dimensions: (1) alert, excited, elated and happy for Pleasant Activation; (2) relieved, serene, relaxed and calm for Pleasant Deactivation; (3) sad, depressed, lethargic and fatigued for Unpleasant Deactivation; and (4) tense, nervous, stressed and upset for Unpleasant Activation. On top, several researchers have empirically tested the placement of different emotion concepts inside the core affect model (e.g., Davern, Cummins, & Stokes, 2007; Kring, Barrett, & Gard, 2003; Remington, Fabrigar, & Visser, 2000; Västfjäll, Friman, Gärling, & Kleiner, 2002; Yik, 2010).

There is an important issue related to the study of emotions, especially in sports: Ekkekakis and Petruzzello (2000) pointed out that researchers should state a strong rationale for the selection of particular emotion concepts in their work. For instance, Jones et al. (2005) included anxiety, anger, dejection, excitement and happiness in the Sport Emotion Questionnaire. According to Russell and Barrett (1999) the first two would represent negative activated emotion concepts, dejection a negative deactivated emotion concept and the final two positive activated emotion concepts. Even though Jones et al. aimed at assessing the most relevant emotions in sports, from a dimensional point of view there is a lack of justification about why no positive deactivated emotions

where considered. Consequently, several authors (e.g., Biddle, 2000) considered the potential of the two-dimensional model of core affect.

Even though there is a need for a rational when selecting emotion variables in one's study, several authors have identified be one main problem with the two-dimensional approach offered by Russell (e.g., Ekkekakis, 2008): there seems to be a variety of overlapping emotion concepts placed in the same quadrant of the model, for instance, fear and anger. *Fear* was said to be a moderately unpleasant and highly activated core affect while *anger* was said to be a highly unpleasant and moderately activated core affect (e.g., Russell & Barrett, 1999). This paper hypothesizes that there is a more fundamental difference between both concepts (anger and fear) than simple non-substantial variations in valence and arousal. Fear precipitates escape from – and avoidance of – future situations (Epstein, 1972) while anger results from a past event perceived to be a “demeaning offence against me and mine” (Lazarus, 2000, p. 234). Thus, in order to cope with this problem and offer researchers an conceptual framework that helps selecting specific emotion concepts for ones' research, this paper presents a new approach to core affect and emotion concepts that adds a third dimension to Russell's two-dimensional approach: Time Perspective.

### A tri-dimensional model of core affect and emotion concepts

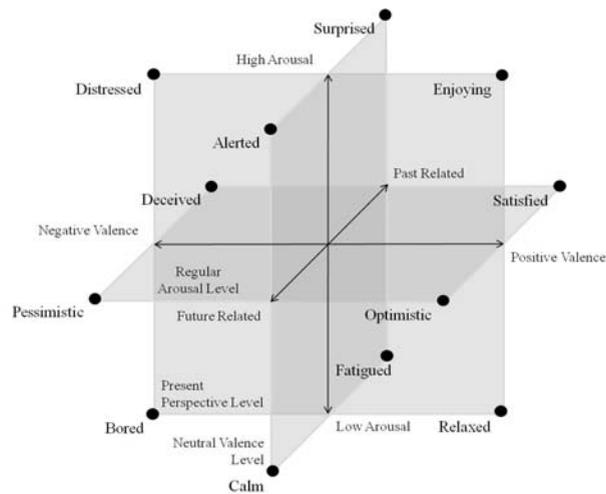


Figure 1. The tri-dimensional model of core affect and emotion concepts: Three basic dimensions, three central levels and twelve (pre-) emotion concepts defined by typical core affects along these three levels.

The basic dimensions and levels of the tri-dimensional model of core affect are displayed in Figure 1, and the emplacement of emotion concepts are displayed in Figure

2. This model is based on former models of core affect that consider two basic dimensions: Arousal and Valence (Larsen & Diener, 1992; Russhall, 1980; Watson & Tellegen, 1985). Arousal ranges from high to low (relatively high or relatively low levels of arousal compared to the regular levels of arousal expected in a certain situation) and Valence from positive to negative. Both *pleasant* and *unpleasant* were replaced as they were considered complex and abstract labels (Wierzbicka, 1992). However, the main difference between former models and this one is a third dimension namely Time Perspective that varies from future related to past related. This dimension considers the placement in time of the real or imagined events that the variations in arousal and valence are related to. Similar to valence, time perspective is a non-conscious judgment. It should be considered a pre-conscious orientation towards something that has already happened, is happening, or is expected to happen. Based on the previous, time perspective relates core affect rather to its referents than to its causes, and separates emotion concepts with similar valence and arousal, such as fear and anger. To some extent, the consideration of time perspective suggests that the variation in core affect is a psychophysiological mechanism through which the individual affronts future -, experiences ongoing - and copes with past events.

Previous rationale for a time perspective was offered by Hanin (1997) who used a time dimension in order to explain the dynamics of emotion. For instance, using Hanin's time dimension Woodman et al. (2009) differentiated pre-performance emotions (anxiousness) and post-performance emotions (anger). However, there is a fundamental difference between Hanin's approach and the current model: Hanin's time dimension relates emotions to real or imagined external events, for instance, a competition, while this new model uses the time dimension as an internal subjective orientation. For example, at any given moment (before, during or after) the athlete can consciously or unconsciously define the specific situation looking at (a) past events that precipitate a core affect he or she identifies as anger, (b) ongoing events that precipitate a core affect he or she identifies as distress, or (c) future events that precipitate a core affect he or she identifies as fear.

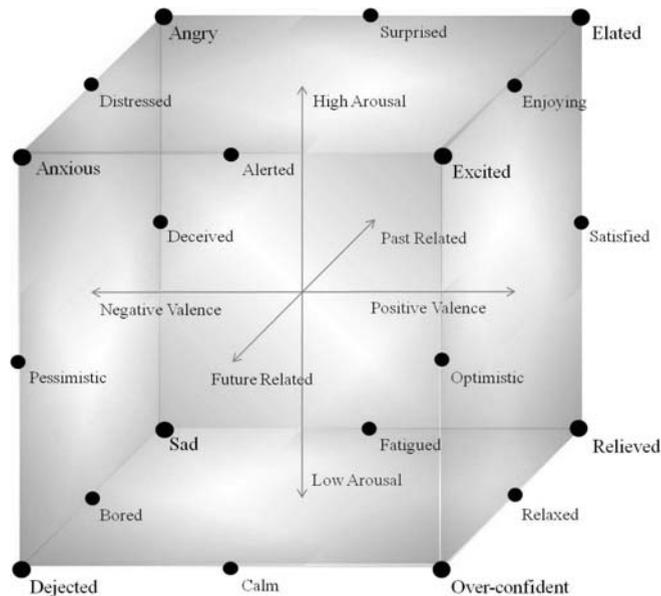


Figure 2. The emplacement of specific emotion concepts insight the tri-dimensional model of core affect.

The three dimensions considered in this model define three central levels: regular arousal, neutral valence and present perspective. Based on the previous theoretical and empirical publication in the core affect domain and in general sport psychology, twenty emotion concepts were placed inside the model in order to represent main core affect states. In line with previous studies (Ekkekakis, 2008), the emotion concepts employed are theoretical decision. Twelve (pre-) emotion concepts represent the typical core affects defined along the three central levels (Figure 1). This paper hypothesizes that the regular arousal level represents cognitive appraisals, the neutral valence level represents somatic sensations and the present perspective represents present-related emotional experiences. In addition to this, eight more typical core affects represented by eight emotion concepts are described by variations in all three dimensions (Figure 2).

**Cognitive appraisals.** The four emotion concepts that represent typical core affects on the regular arousal level are defined by variations in terms of valence and time perspective: *Optimistic*, *pessimistic*, *satisfied* and *deceived*. In previous core affect literature, optimistic has also been considered as opposed to pessimistic on the pleasant-unpleasant continuum (Västufjäll et al., 2002) and satisfied and deceived (disappointed) were considered as pleasant and unpleasant terms respectively related to regular arousal (Kring et al., 2003; Yik, 2010). All four concepts could also be considered pre-emotion

concepts, because emotions are usually characterized by variations of both arousal and valence (e.g., Burton and Naylor, 1997). Further, the present approach hypothesizes that all four concepts represent typical cognitive appraisals related to specific thoughts. For example, confidence related thoughts (e.g., I can achieve my goals) relate to optimism, worries (e.g., I am not going to make it) relate to pessimism, positive evaluations (e.g., I did well) relate to satisfaction and negative evaluations (e.g., I performed poorly) relate to deception.

**Somatic sensations.** The four emotion concepts that represent typical core affects on the neutral valence level are defined by variations in terms of arousal and time perspective: *Alert*, *calm*, *surprised* and *fatigued*. From a theoretical point of view, both alert and calm have been considered opposite terms on the activation-deactivation continuum (e.g., Russell and Barrett, 1999). However, calm has also been considered relative to positive valence, even though empirical data has it proven to be one of the pleasant-deactivated terms that relates less to pleasant valence (Västifjäll et al., 2002). Moreover, all proposed terms that only relate to deactivation (e.g., tired, fatigued, sleepy and exhausted; Davern et al., 2007), do not relate to future events. Russell and Barrett (1999) considered both surprised and fatigued in their model of core affect as activated and deactivated labels, respectively. Similarly to the regular arousal level, these four concepts could also be considered pre-emotion concepts. In their case, they represent typical somatic sensations. For example, tension relates to alert and surprise and looseness relates to clam and fatigue.

**Present-related emotional experiences.** The four emotion concepts that represent typical core affects on the present related level are defined by variations in terms of valence and arousal: *Enjoying*, *distressed*, *relaxed* and *bored*. From a theoretical point of view, distressed (stressed) has been considered inside the models of core affect as an unpleasant activated term (e.g., Davern et al., 2007), and relaxed and bored as deactivated pleasant and deactivated unpleasant terms respectively (e.g., Kring et al., 2003; Västifjäll et al., 2002). Lastly, as all four concepts are defined by variations in terms of valence and arousal, they could also be considered present-related emotion experiences.

**Eight main emotions concepts.** *Anxious* is defined as (a) a high arousal and negative valence emotion related to future events and (b) a combination of pessimism (cognitive appraisal), alert (somatic sensation), and distressed (present related emotion experience). Even though, anxious has been considered an unpleasant activated label (e.g., Russell & Mehrabian, 1974), some researchers have also employed similar terms such as jittery (Russell, 1980) or fear (Russell & Barrett, 1999). This approach opts for anxious as it is widely used in current sport psychology literature (e.g., Smith, Smoll, & Schultz, 1990). *Dejected* is defined as (a) a low arousal and negative valence emotion

related to future events and (b) a combination of pessimism, calm and boredom. This approach opts for dejected as a substitution for the term depressed following recommendations of Jones et al. (2005) who considered depressed to be linked to clinical disorders. Dejected (depressed) has also been described by other authors as an unpleasant deactivated core affect label (e.g., Russell & Barrett, 1999). *Angry* is defined as (a) a high arousal and negative valence emotion related to past events and (b) a combination of deception, surprise and stress. Similar to anxious, angry has been identified in core affect literature as an unpleasant deactivated label (e.g., Russell & Mehrabian, 1974). *Sad* is defined as (a) a low arousal and negative valence emotion related to past events and (b) a combination of deception, fatigue and boredom. Sad has been identified by core affect researchers as an unpleasant deactivated label (e.g., Kring et al., 2003).

*Excited* is defined as (a) a high arousal and positive valence emotion related to future events and (b) a combination of optimism, alert and enjoyment. This term has also been consistently considered in core affect literature, and identified as a pleasure-activated emotion concept (e.g., Russell, 1980). *Over-confident* is defined as (a) a low arousal and positive valence emotion related to future events and (b) a combination of optimism, calm and relaxation. This emotion concept has neither been considered by former theorist of core affect nor by researchers of emotion in sport psychology. Frequent terms used to describe pleasant-deactivated emotions were: at ease, relaxed, calm and serene. This approach has already considered relaxed and calm for over confident's nearby core affects and serene and at ease do not seem to capture the true essence of this core affect. I opted for over-confident because it reflects best the athlete's deactivation based on confidence in relation to future events. For instance, Hanin (2007) noted that "too much confidence result in failure to recruit and use needed resources (insufficient mobilization), and an athlete is actually not ready for the game" (p. 51). However, Remington et al. (2000) already recognized that there is a lack of emotion concepts used for low arousal core affects.

*Elated* is defined as (a) a high arousal and positive valence emotion related to past events and (b) a combination of satisfaction, surprise and enjoyment. In line with most labels employed in this model, elated is a term employed in previous models of core affect representing pleasant activated core affects (e.g., Russell & Barrett, 1999). Nevertheless, emotion measures in sport psychology use similar terms such as happy or joy (e.g., Jones et al., 2005). In this case I opted for elated in order to clearly distinct this core affect and enjoying and because happy has been considered a complex emotion episode (Russell and Barrett, 1999) and, similarly, a concept including both future and past related positive activated emotion concepts (Lundqvist & Kenttä, 2010). Lastly, *relieved* is defined as (a) a low arousal and positive valence emotion related to past events

and (b) a combination of satisfaction, fatigue and relaxation. Russell and Barrett (1999) also used relieved as a pleasant deactivated concept.

### Specific Considerations

**The essence of core affect.** The concept of core affect should not replace the idea of emotion (for a review see, Russell, 2009). Core affect is a psycho-physiological state that can be cognitively appraised by the individual as a single feeling or a certain emotion. Even though it is suggested that core affects are experienced and identified by the athlete as closed emotion concepts, core affect itself is a tendency that varies continuously (Diener & Iran-Nejad, 1986). Consequently, this model does not consider separate irreducible feelings, but core affects that are defined by tendencies in arousal, valence and time perspective.

Based on the above, core affect could be considered a basic unit in emotion literature. From a hierarchical perspective, emotion concepts represent the following step in complexity, as they include correlates and consequences. Moreover, several authors have considered complex emotion episodes that comprise several basic core affects and emotion concepts (e.g., Fehr & Russell, 1984, Storm & Storm, 1987). For instance, happiness was considered a complex emotion episode that could be subdivided into emotion concepts such as elated, excited, happy, relieved, serene, and relaxed (Russell & Barrett, 1999). Thus, happiness includes a range of positive valence core affects with high and low arousal and future, present and past perspective.

**The tri-dimensional model as a simplistic representation.** Since the aim of this model is to offer researchers a theoretical framework when studying emotions, it does not contemplate personal and social antecedents (e.g., psychological basic need satisfaction and motivational climate, respectively); psycho-physiological, cognitive and behavioral correlates (e.g., activation of the autonomic nervous system, worries and facial expression, respectively); and performance related consequences (e.g., *good* versus *poor* performance). Consequently, some relevant issues related to emotions and sport, such as Hanin's facilitative-debilitative dimension (e.g., Hanin, 2000), are not considered in this simplistic model.

One important issue regarding the simplistic nature of this model is the relation between and the effects of specific emotion experiences. Firstly, the valence dimension was considered to be more critical than the arousal dimension for determining the relation between emotions (Feldman, 1995). For instance, excited would be expected to correlate positively with over-confident and negatively with anxious. Davern et al. (2007) even suggested that the former two-dimensional circumplex model would rather be an ellipse than a circle. Secondly, Barrett (1998) pointed out the role of *valence focus*

and *arousal focus* for the internal relation between different subjective emotional experiences. Thus, individuals with high valence focus would produce larger correlations between positive emotion concepts than individuals with low valence focus. Thirdly, Hanin (1995, 1997, 2000) used two interrelated factors to explain individual differences in relation to emotions' effect over performance: *valence* and *performance functionality*. With regards to the latter, Hanin suggested that the subjective classification of a specific emotion as *optimal* or *dysfunctional* is most critical for the emotions effects upon sport performance. For instance, anger is related to *poor* performance if the athlete perceives it as dysfunctional and to *good* performance if he or she perceives it as optimal.

Finally, some authors have considered that positive arousal and negative arousal relate to different neurological processes and therefore to two separate dimensions (e.g., Cacioppo & Berntson, 1994). However, research has shown that an uncoupled activation (i.e., independent positive or negative activation) or nonreciprocal activation (i.e., parallel positive and negative activation) is situation specific as well as unusual and that the vast majority of individuals report reciprocal activation (i.e., opposing positive and negative activation) of positive and negative processes (Ito, Cacioppo, & Lang, 1998). Thus, the argument in support of the notion of the independence of positive and negative valence was discussed and considered (a) not referring to the term of core affect but to more complex emotional episodes (Russell & Barrett, 1999) and (b) not representing accurately the available evidence (Sergerie, Chochol, & Armony, 2008). Consequently, I suggest that the use of one positive-negative dimension is adequate and fits in this simplistic representation of core affect and emotion concepts.

#### **Where does this new model of core affect and emotion concepts fit in?**

This question was raised by Ekkekakis (2008) with respect to the two-dimensional circumplex model. On the one hand, the author resumed a series of potential benefits of the model (e.g., Biddle, 2000). Mainly, its capability to offer (a) an appropriately broad framework for current research, (b) an “unparalleled breadth of scope and parsimony” (p. 141), (c) a domain-general approach that should not favor specific experimental conditions or treatments, and (d) an extensive empirical and theoretical background that allows for deductive or theory-driven measurement development. However on the other hand, the author also recognized a series of considerations upon which to question the two-dimensional approach: Firstly, due to its parsimony and breadth it lacks on specificity. As previously mentioned, it is unable to distinguish clearly between several emotions that are defined by equal positions in terms of arousal and valence (e.g., fear and anger). Secondly, the model of core affect is not a model of emotions or moods. Lastly, the underlying structure of those measures based on the model had not been formally and appropriately evaluated.

In order to represent a useful conceptual framework for researchers, this new approach to core affect and emotion concepts is thought to offer similar benefits to research while coping with some of its problems. On the one hand, this tri-dimensional approach should, similarly, (a) provide a broad framework, (b) offer scope and parsimony, (c) be domain-general and (d) build upon extensive theoretical framework regarding the dimensional approach to core affect and emotion, therefore generating subsequent empirical evidence in its favor. On the other, this approach should also cope with many of the overlapping emotion concepts by considering the third dimension Time Perspective. Nevertheless, this model is still a model of core affect and emotion concepts, thus it does not consider the entire width of emotions and moods (e.g., it does not consider behavioral correlates).

There also remain several considerations when planning future research. Future studies should address the theoretical structure posited in this text. Specific measures need to identify core affects and emotion concepts in order to study the relation between variations in terms of all three dimensions and their corresponding emotion concepts. Furthermore, this model also suggests specific relations between emotional concepts. For instance, excitement should relate positively to optimism but negatively to dejection. Empirical evidence from research upon this matter is essential. Finally, several emotion concepts were proposed although the specific concept employed may vary in different contexts. It is plausible that the underlying core affect of these overlapping terms is identical but that, due to their specific context, the cognitive and behavioral correlates might vary (e.g., optimism-related behavior should be directed towards a certain upcoming event while trust-related behavior would be directed to another individual). As mentioned earlier, there is clearly a need for future research and scientific evidence. Specifically, emotion concepts have to be related to different core affects (e.g., which emotions represent positive, activated and future related core affects?) and the underlying core affect has to be assessed when experiencing different emotions (e.g., when you feel excited, to what degree [1] do you evaluate the situation as positive or negative, [2] are you physically activated or deactivated, and [3] do you focus on upcoming or past events).

## CONCLUSION

The purpose of this manuscript was to present a new tri-dimensional model of core affect and emotion concepts to researchers and applied sport psychologists. This model adds a third dimension, Time Perspective, to former two-dimensional models (e.g., Russell, 1980). The model is built upon three central levels that contain twelve (pre) emotion concepts. Furthermore, eight more core affects are defined by variations in all

three dimensions and by their nearby (pre) emotion concepts. Based on the hypothesis that (1) regular arousal level's emotion concepts (e.g., pessimistic) represent cognitive appraisal (e.g., worries) and (2) neutral valence level's emotion concepts (e.g., alert) represent somatic sensations (e.g., tension), the latter eight emotion concepts (e.g., anxiety) are defined by cognitive and somatic components plus a present related emotional experience (e.g., distress).

Based on the existing literature, there are three fundamental considerations concerning core affect and emotion concepts: (1) core affects are psycho-physiological tendencies that vary along three universal dimension (arousal, valence and time perspective) and will always exist independently to conscious appraisal; (2) specific emotions are conscious appreciations upon core affect and as such they are identified as discontinuous states, namely emotion concepts that depend on culture, language, specific contexts and personality; and (3) core affects represent a psycho-physiological reality that does not consider cognitive and behavioral correlates and consequences, while emotion concepts represent subjective appreciations that are related to cognitive and behavioral correlates and consequences.

Finally, researchers may choose to employ this model when designing emotion-measures and when studying the effects of psychological interventions upon sport and exercise behavior. Moreover, applied sport psychologists may also consider this model a useful tool when explaining to athletes the concept of *emotions*, helping athletes to understand their own emotions and to know when to employ certain strategies to cope with them. However, there is a need for empirical research in regard to the actual benefits and shortcomings of this new approach to core affect and emotion concepts.

### **Acknowledgement**

The author thanks Dr. Font Lladó, Dr. Lopez Ros (both Universitat de Girona) and Dr. Torregrosa (Universitat Autònoma de Barcelona). Their useful comments helped to improve the quality of this manuscript.

### **REFERENCES**

- Allen, M. S., Jones, M. V., & Sheffield, D. (2009). Causal attribution and emotion in the days following competition. *Journal of Sports Sciences*, 27, 461-468.
- Barrett, L. F. (1998). Discrete emotions or dimensions? The role of valence focus and arousal focus. *Cognition and Emotion*, 12, 579-599.
- Biddle, S. (2000). Exercise, emotions, and mental health. In Y.L. Hanin (Ed.), *Emotions in sport* (pp. 267-291). Champaign, IL: Human Kinetics.

- Bishop, D. T., Karageorghis, C. I., & Kinrade, N. P. (2009). Effects of musically-induced emotions on choice reaction time performance. *The Sport Psychologist, 23*, 59-76.
- Burton, D., & Naylor, S. (1997). Is anxiety really facilitative? Reaction to the myth that cognitive anxiety always impairs sport performance. *Journal of Applied Sport Psychology, 9*, 295-302.
- Cacioppo, J. T., & Berntson, G. B. (1994). Relationship between attitudes and evaluative space: A critical review, with emphasis on the separability of positive and negative substrates. *Psychological Bulletin, 115*, 401-423.
- Davern, M. T., Cummins, R. A., & Stokes, M. A. (2007). Subjective wellbeing as an affective-cognitive construct. *Journal of Happiness Studies, 8*, 429-449.
- Diener, E., & Iran-Nejad, A. (1986). The relationship in experience between various types of affect. *Journal of Personality and Social Psychology, 50*, 1031-1038.
- Edmunds, J., Ntoumanis, N., & Duda, J. L. (2006). A test of self-determination theory in the exercise domain. *Journal of Applied Social Psychology, 36*, 2240-2265.
- Ekkekakis, P. (2008). Affect circumplex redux: the discussion on its utility as a measurement framework in exercise psychology continues. *International Review of Sport and Exercise Psychology, 1*(2), 139-159.
- Ekkekakis, P., & Petruzzello, S. J. (2000). Analysis of the affect measurement conundrum in exercise psychology: I. Fundamental issues. *Psychology of Sport & Exercise, 1*, 71-88.
- Epstein, S. (1972). The nature of anxiety with emphasis upon its relationship to expectancy. In C. D. Spielberger (Ed.), *Anxiety: Current trends in theory and research* (Vol. 2, pp. 291-337). New York: Academic Press.
- Fehr, B., & Russell, J. A. (1984). Concept of emotion viewed from a prototype perspective. *Journal of Experimental Psychology: General, 113*, 464-486.
- Feldman, L. A. (1995). Valence focus and arousal focus: Individual differences in the structure of affective experience. *Journal of Personality and Social Psychology, 69*, 153-166.
- Frijda, N. (2008). The psychologists' point of view. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (3rd ed., pp. 68-87). New York: Guilford Press.
- Hanin, Y. L. (1995). Individual zones of optimal functioning (IZOF) model: An idiographic approach to performance anxiety. In K. Henschen & W. Straub (Eds.), *Sport psychology: An analysis of athlete behavior* (pp. 103-119). Longmeadow, MA: Movement Publications.
- Hanin, Y. L. (1997). Emotions and athletic performance: Individual zones of optimal functioning model. *European Yearbook of Sport Psychology, 1*, 29-72.

- Hanin, Y. L. (2000). Individual zones of optimal functioning (IZOF) model: Emotions-performance relationships in sport. In Y.L. Hanin (Ed.), *Emotions in sport* (pp. 65-89). Champaign, IL: Human Kinetics.
- Hanin, Y. L. (2007). Emotions in Sport: Current Issues and Perspectives. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of Sport Psychology*, 3<sup>rd</sup> Edition (pp. 31-58). Hoboken, New Jersey: John Wiley & Sons, Inc.
- Hanin, Y. L., & Syrjä, P. (1995). Performance affect in junior ice hockey players: An application of the Individual Zones of Optimal Functioning model. *The Sport Psychologist*, *9*, 169-187.
- Hatzigeorgiadis, A., Zourbanos, N., Galanis, E., & Theodorakis, Y. (2011). Self-talk and sport performance: A meta-analysis. *Perspectives on Psychological Science*, *6*, 348-356.
- Ito, T. A., Cacioppo, J. T., & Lang, P. J. (1998). Eliciting affect using the International Affective Picture System: Trajectories through evaluative space. *Personality and Social Psychology Bulletin*, *24*, 855-879.
- Jones, M. V. (2003). Controlling emotions in sport. *The Sport Psychologist*, *17*, 471-486.
- Jones, M. V., Lane, A. M., Bray, S. R., Uphill, M., & Catlin, J. (2005). Development and validation of the sport emotion questionnaire. *Journal of Sport and Exercise Psychology*, *27*, 407-431.
- Kring, A. M., Barrett, L. F., & Gard, D. E. (2003). On the broad applicability of the affective circumplex: Representations of affective knowledge among schizophrenia patients. *Psychological Science*, *14*(3), 207-214.
- Larsen, R. J., & Diener, E. (1992). Promises and problems with the circumplex model of emotion. *Review of Personality and Social Psychology*, *13*, 25-59.
- Lazarus, R. S. (2000). How emotions influence performance in competitive sports. *The Sport Psychologist*, *14*, 229-252.
- Lundqvist, C., & Kenttä, G. (2010). Positive Emotions are not simply the absence of the negative ones: Development and validation of the emotional recovery questionnaire (EmRecQ). *The Sport Psychologist*, *24*, 468-488.
- Martens, R., Burton, D., Vealey, R. S., Bump, L. A., & Smith, D. E. (1990). Development and validation of the Competitive State Anxiety Inventory-2. In R. Martens, R. S. Vealey, & D. Burton (Eds.), *Competitive anxiety in sport* (pp. 117-190). Champaign, IL: Human Kinetics.
- Martinet, G., & Ferrand, C. (2009). A naturalistic study of the directional interpretation process of discrete emotions during high-stakes table tennis matches. *Journal of Sport and Exercise Psychology*, *31*, 318-336.
- Niedenthal, P. M. (2008). Emotion concepts. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of Emotions* (3<sup>rd</sup> ed., pp. 587-600). New York: The Guilford Press.

- Öhman, A. (2008). Fear and anxiety: Overlaps and dissociations. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of Emotions* (3rd ed., pp. 709-729). New York: The Guilford Press.
- Quested, E., & Duda J. L. (2010). Exploring the social-environmental determinants of well- and ill-being in dancers: A test of basic needs theory. *Journal of Sport and Exercise Psychology*, *32*, 39-60.
- Remington, N.A., Fabrigar, L.R., & Visser, P.S. (2000). Reexamining the circumplex model of affect. *Journal of Personality and Social Psychology*, *79*, 286-300.
- Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39*, 1161-1178.
- Russell, J. A. (1991). Culture and the categorization of emotion. *Psychological Bulletin*, *110*, 426-450.
- Russell, J. A. (2005). Emotion in human consciousness is built on core affect. *Journal of Consciousness Studies*, *12*, 26-42.
- Russell, J. A. (2009). Emotion, core affect, and psychological construction. *Cognition and Emotion*, *23*, 1259-1283.
- Russell, J. A., & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology*, *76*, 805-819.
- Russell, J. A., & Mehrabian, A. (1974). Distinguishing anger and anxiety in terms of emotional response factors. *Journal of Consulting and Clinical Psychology*, *1*, 79-83.
- Scanlan, T. K., Babkes, M. L., & Scanlan, L. A. (2005). Participation in sport: A developmental glimpse at emotion. In J. L. Mahoney, R. W. Larson, & J. S. Eccles (Eds.), *Organized activities as contexts for development: Extracurricular activities, after-school and community programs* (pp. 275-309). Mahwah, NJ: Erlbaum.
- Sergerie, K., Chochol, C., & Armony, J. L. (2008). The role of the amygdala in emotional processing: A quantitative meta-analysis of functional neuroimaging studies. *Neuroscience and Biobehavioral Reviews*, *32*, 811830.
- Smith, R. E., Smoll, F. L., & Schultz, R. W. (1990). Measurement and correlates of sport specific cognitive and somatic trait anxiety: The Sport Anxiety Scale. *Anxiety Research*, *2*, 263-280.
- Spielberger, C. D. (1991). *Manual for the State-Trait Anger-expression Inventory*. Odessa, FL: Psychological Assessment Resources.
- Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school PE. *British Journal of Educational Psychology*, *75*, 411-433.
- Storm, C., & Storm, T. (1987). A taxonomic study of the vocabulary of emotions. *Journal of Personality and Social Psychology*, *53*, 805-816.

- Torregrosa, M., Sousa, C., Viladrich, C., Villamarín, F., & Cruz, J. (2008). El clima motivacional y el estilo de comunicación del entrenador como predictores del compromiso en futbolistas jóvenes [Motivational climate and coaches' communication style predict young soccer players' commitment]. *Psicothema*, *20*(2), 254-259.
- Torregrosa, M., Viladrich, C., Ramis, Y., Azócar, F., Latinjak, A. T., & Cruz J. (2010). Efectos en la percepción del clima motivacional generado por los entrenadores y compañeros sobre la diversión y el compromiso. Diferencias en función de género [Effects on the perception of the motivational climate created by coaches and teammates on enjoyment and commitment. Gender differences]. *Revista de Psicología del Deporte*, *20*(1), 243-255.
- Vast, R. L., Young, R. L., & Thomas, P. R. (2010). Emotions in sport: Perceived effects on attention, concentration, and performance. *Australian Psychologist*, *45*(2), 132-140.
- Västifjäll, D., Friman, M., Gärling, T., & Kleiner, M. (2002). The measurement of core affect: A Swedish self-reported measure derived from the affect circumplex. *Scandinavian Journal of Psychology*, *43*, 19-31.
- Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin*, *98*, 219-235.
- Wierzbicka, A. (1992). Defining emotion concepts. *Cognitive Science*, *16*, 539-581.
- Woodman, T., Davis, P. A., Hardy, L., Callow, N., Glasscock, I., & Yuill-Proctor, J. (2009). Emotions and sport performance: An exploration of happiness, hope, and anger. *Journal of Sport & Exercise Psychology*, *31*, 169-188.
- Yik, M. (2010). Affect and interpersonal behaviors: Where do the circumplexes meet? *Journal of Research in Personality*, *44*, 721-728.

Manuscrito recibido: 11/10/2011

Manuscrito aceptado: 19/12/2011

