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Affective Learning Design and the Development of Expertise in Sport

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Abstract

Objectives and method: Developing expertise in sport requires the design of learning environments and athlete development programmes that successfully sample and represent conditions of performance contexts during practice. This premise is captured by the concept of representative learning design, founded on an ecological dynamics approach to acquiring skill in sport, and predicated on the mutuality of the individual-environment relationship as the appropriate level of analysis. In this position paper we argue that to effectively develop expertise in sport, the role of affect (emotion) should be considered in the representative design of learning experiences.

Results and Conclusions: We discuss how ongoing interactions between affect, cognitions, perceptions and actions, provide a principled basis for affective learning designs in sport. Considering the role of affect in learning environments has clear implications for how sport psychologists, athletes and coaches might collaborate to enhance the acquisition of expertise in sport.

Keywords: representative design, affect, emotion, expertise, learning, ecological dynamics

1. Introduction

Emotions are embedded in performance, however their role in the pursuit of excellence in sport has often been neglected. Performers should be immersed in learning environments that challenge and stimulate. This poses an interesting question about how to effectively simulate performance contexts during the development of expertise. To give a principled answer this question, the ecological dynamics approach seems appropriate. An ecological dynamics approach to developing expertise recognises the mutual relationship between an organism/individual and the environment, described through an integration of key concepts in ecological psychology and dynamical systems theory (Araújo & Davids, 2011; Davids, Araújo, Vilar, Renshaw, & Pinder, 2013; Seifert, Button, & Davids, 2013). It has been argued that traditional approaches have tended to focus primarily on the processes and structures within organisms, leading to an organismic asymmetry, or inordinate emphasis on internalised structures and processes to explain behaviour (Davids & Araújo, 2010). In the study of perception and action, Gibson (1979) proposed that the movements of an individual bring about changes in surrounding energy flows (e.g., light) from which affordances (opportunities for action) are perceived to support further movement. As a result a cyclic process is created where action and perception feed off each other to underpin goal-directed behaviours in specific performance environments (Gibson, 1979). Studying emergent behaviour and the development of expertise at the individual-environment scale of analysis takes into account how perceptions, actions, intentions and thoughts emerge under the constraints of information external and internal to the organism (Seifert & Davids, 2012; Warren, 2006).

The concepts and ideas of ecological dynamics can be adopted to underpin a principled approach to learning (e.g. in clinical work, Newell & Valvano, 1998). Systematically manipulating control parameters perturbs attractor states (stable) and facilitates phase transitions and new organisational states or behaviours to emerge (Kelso, 1995, 2012). Physical or informational constraints (see Newell, 1986; Warren, 2006) in a specific environment can act as control parameters, moving a dynamic neurobiological system through potential behavioural states of order and organisation (Newell & Valvano, 1998). Attractors take the form of intentions, and/or goals that the performer is drawn towards following changes in control parameter values (Davids, et al., 2013; Davids, Williams, Button, & Court, 2001; Warren, 2006). These stable states represent system organisation that is functional (i.e. 'what works') and at the same time satisfies the psychological needs (i.e. 'what feels appropriate') of the performer during specific performances (Hollis, Kloos, & Van Orden, 2009; Lewis, 2004). In order for an attractor to become stable through learning, the intrinsic dynamics of a performer and the situational task dynamics (e.g., performance requirements) must match or converge (Davids, et al., 2001; Zanone & Kelso, 1992). While the relative stability created by establishing attractors is important to facilitate successful performance at specific moments in time, learning environments also need to be dynamic to reflect changing individual, task and environmental constraints over short and long time timescales of emergent expertise (Lewis, 2002; Newell, 1986). A key question then is how to effectively manipulate constraints to facilitate the development of new attractor patterns essential to expertise development in sport.

Sport psychologists have begun to identify control parameters to provide effective learning environments that are carefully matched to each performer's intrinsic dynamics, pushing them into metastable regions, where rich and creative behavioural solutions can emerge (Hristovski, Davids, Araújo, & Button, 2006; Pinder, Davids, & Renshaw, 2012). Metastability reflects the tendency of system components competing in an attempt to function both individually, and in unison concurrently (Kelso, 2012). It is a state of partial organisation that allows a system to function while transitioning between co-existing states of coordination (Chow, Davids, Hristovski, Araújo, & Passos, 2011; Kelso & Tognoli, 2009; Pinder, et al., 2012). When pushed into metastable regions of system organisation during learning events, a complex neurobiological system 'hovers' near regions of instability, displaying behavioural flexibility (variability, instability), as learners search for functional solutions (attractors) to the new constraints of the environment (Kelso, 1995; Seifert, et al., 2013). This system instability is functional for individuals seeking to acquire adaptive movement behaviours as solutions to performance problems and challenges. Increases in movement variability are often accompanied by increased intensity and range of emotions, which are useful to sport psychologists as they act as markers or predictors for phase transitions (Chow, et al., 2011; Kelso, 1995). Adopting novel and functional states of organisation is therefore a consequence of a process of learning or development, as individuals transit from the 'known' to the 'unknown' during learning. The learning process can be emotionally challenging as new stable patterns of behaviour emerge and begin to form characteristic responses to specific information flows between the performer and environment (Lewis, 2000b; Smith & Thelen, 2003). As a result, designing learning environments which force athletes into metastable regions (physically and emotionally) may result in the development of higher levels of expertise (Pinder, et al., 2012).

Representative Learning Design

In skill acquisition, an important challenge for sport psychologists and practitioners is how to design learning environments that successfully simulate (aspects of) competitive performance environments in sport. Egon Brunswik (1956) advocated that, for the study of individual-environment relations, cues or perceptual variables should be sampled from an organism's environment to be representative of the environmental stimuli that they are adapted from, and to which behaviour is intended to be generalised (Araújo, Davids, & Passos, 2007; Pinder, Davids, Renshaw, & Araújo, 2011b). The term representative design captures the idea of sampling perceptual variables from an individual's 'natural' environment to be designed into an experimental task (Brunswik, 1956). Recent work has discussed the concept of representative design in relation to the study of human performance and behaviour in sport (Araújo, Davids, & Hristovski, 2006; Araújo, et al., 2007). Inspired by Brunswik's (1956) insights, the term representative learning design (RLD) has been proposed to highlight the importance of creating representative environments for learning skills and developing expertise (Davids, Araújo, Hristovski, Passos, & Chow, 2012; Pinder, et al., 2011b).

Some empirical work on RLD has focussed on visual information provided in performance tasks (Pinder, Davids, Renshaw, & Araújo, 2011a), practice in differing performance environments in elite athlete programmes (Barris, Davids, & Farrow, in press), and changes to the complexity of tasks for practising passing skills in team games (Travassos, Duarte, Vilar, Davids, & Araújo, 2012). These examples advocate developing expertise by nurturing the relationship between key environmental information sources and the actions of a performer in order for functional movement behaviours to emerge (Davids, et al., 2013; Phillips, Davids, Renshaw, & Portus, 2010). From this perspective the development of expertise is predicated on the effective simulation of performance conditions during practice/learning rather than traditional methods of decomposing tasks to isolate individual task components in order to manage the information load confronting learners (Phillips, et al., 2010; Pinder, Renshaw, & Davids, 2013).

In existing theory, an aspect of RLD, that needs attention in future conceptualisations of learning and practice concerns the role of affective[1] constraints on behaviour (for initial discussions see, Pinder, Renshaw, Headrick, & Davids, in press). In sport, performers need to be able to manage task demands while performing under potentially high emotional states

[1] The broad term of affect refers to a range of phenomena such as feelings, emotions, moods, and personality traits that interact over different time scales. Here affect will be used interchangeably with emotion to follow previous modelling of cognition, emotion and action (Lewis, 2000a; Vallerand & Blanchard, 2000).

induced in competitive performance that might influence their cognitions, perceptions and actions (Jones, 2003; Lewis, 2004). Previous work investigating affect in sport performance has tended to focus on capturing the emotions of athletes in ‘snapshots’ of performance at one point in time, such as before or after performance in a competition (for a recent example see Lane, Beedie, Jones, Uphill, & Devenport, 2012). Such an approach, however, has not considered how emotions might continuously interact with intentions, cognitions, perception and action to constrain the acquisition of perceptual-motor skills and the development of expertise from a holistic perspective. A holistic approach should take into account task demands, the states of the environment, and the dynamic emotional states of the performer as interacting constraints on emergent behaviours (Davids, et al., 2013; Newell, 1986). Therefore sport psychologists and pedagogues must look for ways to sample these conditions in learning environments and practice simulations. To address this issue, in the following sections of this paper, we will discuss why and how emotions could be incorporated into representative learning designs to enhance the development of expertise in sport.

2. Affective Learning Design

The benefits of creating emotion-laden learning events have been demonstrated within the psychology literature. Emotions influence perceptions, actions and intentions in terms of decision-making, with the level of emotion generated reflecting the significance of the stimuli to the individual and the strength of the response on the visual cortex (Pessoa, 2011). Emotion also acts to strengthen memories (positive or negative) and produces greater engagement in ambiguous, unpredictable, or threatening situations when individual and group goals are influenced (i.e., such as learning when failure might have significant consequences) (LaBar & Cabeza, 2006; Pessoa, 2011).

Despite these proposed benefits, the role of emotion in the pursuit of expertise in sport has often been neglected (or removed) because emotion-laden responses are traditionally considered irrational or instinctive, and therefore perceived as negative (Hutto, 2012). An issue of concern is how to support individuals in the task of learning to perform under the specific constraints of an emotion-charged competitive performance environment. Emotionless responses made from a purely informational stance have been described as 'cold cognition', and emotion-laden responses as 'hot cognition' (Abelson, 1963). The expression of 'sit on your hands' in relation to choosing a move in a game of chess is an example of the view that it is necessary to suppress or remove emotions in order to make more rational decisions (i.e. cold cognition) (Charness, Tuffiash, & Jastrzembski, 2004). During learning and performance in sporting contexts, learners are often not afforded this 'thinking' time and need to be able to act immediately based on the initial, fleeting interaction between their perceptions of the task and pre-existing physical, cognitive, and emotional capabilities (Davids, 2012).

Progress in understanding emotions during learning has also been limited by a tendency towards traditional linear thinking, perpetuating the debate about the pre-eminence of cognition over emotion, where cognitions of events are thought to result in preconceived emotional reactions (Lewis & Granic, 2000). However, some psychologists have recently begun to acknowledge the advantages of considering humans as complex, dynamical systems when explaining behaviour (Lewis, 1996; Lewis & Granic, 2000). From this approach cognition and emotion are considered to influence each other in a coupled feedback loop where cognitions can bring about emotions, and emotions can shape cognitions (Lewis, 2004). This cyclical interaction is considered to underpin the self organisation of cognitive, emotional and perceptual aspects of task experiences in performance contexts and situations (Lewis, 1996, 2000a). Memorized emotional experiences represent patterns of behaviour that are stable attractor states which form when emotional and cognitive changes/responses become linked or synchronised, and subsequently facilitate the emergence of action tendencies (behaviour) (Lewis, 2000a). In this line of thinking, affect, cognition, and behaviours self organise to develop emergent, characteristic responses that shape the intrinsic dynamics of an individual in specific environments (Davids, et al., 2001; Schöner, Zanone, & Kelso, 1992). For example in the development of personality, trait like behaviours and thoughts and feelings become predictable situation specific responses of an individual (Lewis, 1996).

During the development of emotional interpretations, changes in constraints may lead to metastable periods during performance when an individual may be constrained to adopt one of a 'cluster' of possible cognitive-emotive states (Hollis, et al., 2009; Lewis, 2000b, 2004). During a period of metastability (for example during learning), behavioural tendencies of an individual would be expected to exhibit increased variability until a more stable state of behaviour emerges (Chow, et al., 2011; Hollis, et al., 2009). Accompanying this variability in performance behaviours, variable and individualised emotional responses also emerge (Lewis, 1996, 2004). Much like movement variability, emotion during learning (and performance) has previously been considered, as unwanted system noise (Davids, Glazier, Araújo, & Bartlett, 2003; Smith & Thelen, 2003). Here, we argue that the presence of emotion during learning is indicative of a performer being engaged or investing in task performance as they explore and exploit available affordances to satisfy their intentions and goals (Jones, 2003; Seifert, et al., 2013). For example, gymnasts attempting routines on balance beams of increasing height have been found to display performance decrements, elevated heart rate, and increased prevalence of perceived dysfunctional emotions (e.g. reporting feeling nervous or scared) (Cottyn, De Clercq, Crombez, & Lenoir, 2012). These findings were particularly evident on the first attempt of the highest beam height, highlighting the often intense emotions involved with moving out of a ‘comfort zone’ in attempting a new or more challenging task. Similarly, comparing climbing traverses identical in design, but of different heights revealed that the higher traverses produced increased anxiety, elevated heart rates, longer climbing duration, and increased exploratory movements in climbers (Pijpers, Oudejans, & Bakker, 2005).

In understanding the implications of this evidence for the acquisition of expertise in sport, it is clear that sport psychologists need to consider the emergence of movement behaviours in association with patterns of emotional and cognitive states of individual performers. Through the process of developing expertise, performers will experience periods of failure or success as they strive to achieve a high level of ‘fitness’ for specific performance landscapes (Collins & MacNamara, 2012). Learning environments need to be designed to include specific ‘situational constraints’ that shape and regulate both emergent movement behaviours and the emotional interpretations of a task in relation to the specific tactical intentions of a performer (Davids, et al., 2001). From this approach, emotions are not only highly influenced by the constraints of the task, but also act as constraints on future behaviours emerging across interacting timescales (i.e. performance, learning and development timescales) (Lewis, 2000a, 2004). Yet to be seen in the literature, however, is a principled exploration of the role of emotions in developing expertise in sport. Here we discuss some principles that could underpin initial understanding of how learning design might be shaped by affective constraints and their interactions with cognitions, perception and actions of athletes. The established interactions between affect, cognitions, and actions provide a principled basis for the concept of affective learning design (ALD). This notion advocates the role of affect in considering how to develop expertise through learning experiences that effectively simulate the interacting constraints of competitive performance environments in sport (Pinder, et al., 2011b; Pinder, et al., in press).

3. Affective Learning Design in Practice

The intertwined relationship between movement behaviour and emotions poses many challenges and implications for sport psychologists interested in understanding how the concept of ALD can be applied to the development of expertise in sport. Key aspects of ALD include adopting an individualised approach, catering for beginners through to expert performers, creating scenarios or vignettes to provide context in learning environments, and distinguishing clear performance goals for learning, performance and competitive environments. Practitioners need to sample, predict and plan for the potential emotional and cognitive circumstances in competition, and adequately sample them in learning simulations. The following discussion of these ideas includes a series of practical examples of how ALD might be embraced by sport psychologists, pedagogues, coaches, and athletes.

3.1. The individualisation of affect

Of major significance for the design of affective learning environments is catering for individual differences between performers, such as between beginners and experts. Coaches and sport psychologists must collaborate to individually tailor learning experiences based on skill level, personalities, learning styles, and psychological strengths/weaknesses (Renshaw, Davids, Shuttleworth, & Chow, 2009). For example, it is worth considering some data on how skill-based differences might interact with emotions to constrain cognitions, perceptions and actions of different individuals (Seifert, Button & Davids, 2013). A comparison of the performance of ice climbers revealed that the intra-individual movement choices (e.g. kicking, hooking) and inter-limb coordination modes of novices displayed less variability than those of experts (Seifert & Davids, 2012). In this research novices tended to intentionally adopt an ‘X’ position with their arms and legs that provided highly stable interactions with the surface of the ice. These coordination patterns were considered functional by the novices since they provided stability on the ice surface. However, adoption of these highly stable action patterns was not functional for the goal of climbing the ice quickly, as related to the levels of variability in positioning demonstrated by the experts. The implication is that energy efficiency and competitive performance were not prioritised in the goals of novice performers, whose fear in interacting with the ice surface, was a major constraint on their particular cognitions, perceptions and actions. Therefore the intentions (i.e. stable position vs. efficient and competitively effective climbing movements) of each performer, based on their perception of affordances, provide opportunities for a coach or sport psychologist to manipulate performance constraints to suit individual psychological and behavioural needs to promote the acquisition of expertise. In doing so a coach will develop an understanding of the most successful methods for pushing each performer into metastable regions where emotions and/or actions are destabilised. As a result the performer will be forced to explore the specific performance environments created during learning to adopt new functional states of stable system organisation, while maintaining confidence levels (Chow, et al., 2011; Renshaw, et al., 2009). This approach is synonymous with psychological 'profiling' and shares some ideas with the notion of individual zones of optimal functioning (IZOF) model advocated by Hanin (e.g. Hanin, 2007; Hanin & Hanina, 2009) in which the interaction between emotions and actions during optimal performance is considered to be highly individualised.

3.2. Time-scales and affects

The individualised nature of emotions must also take into account the different interacting time scales of learning that influence the development of expertise (Newell, Liu, & Mayer-Kress, 2001). The critical relationship between the timescale of perception and action (short term over seconds and minutes) and those of learning and development (longer term over days, weeks and months) predicates how an individual might approach specific situational constraints. From a complex systems perspective perception and action constrain the emergence of long term patterns or behavioural states (Lewis, 2000a, 2002). Initial experiences of a performer will influence how he/she approaches tasks in the future, which emphasises the importance of tailoring the design of learning tasks to individual needs at all stages of the expertise pathway (Côté, Baker, & Abernethy, 2003). For example, qualitative evidence from interviews with expert team sport athletes revealed that the roles and expectations of coaches change along the pathway to expert performance (Abernethy, Côté, & Baker, 2002). Perceptions of coaches at early stages of sport participation were based on creating positive environments (leading to positive emotions) that were engaging and fun while also developing basic skills. As athletes developed, the relationship with the coach became more tightly coupled and tended to increasingly emphasise the acquisition of sport specific knowledge for managing the physical, emotional, and cognitive needs at an individual level (Abernethy, et al., 2002; Côté, et al., 2003). Hence, by designing learning environments that cater for changing emotions, cognitions and actions, performers are more likely to engage with or 'buy into' the rigorous demands of long term development programmes (Renshaw, Chow, Davids, & Hammond, 2010; Renshaw, Oldham, & Bawden, 2012).

3.3. Emotions are embedded in situation-specific constraints

Emotion-laden experiences are considered to energise behaviour and facilitate an investment in tasks because emotions add context to actions, rather than an athlete merely 'going through the motions' (Jones, 2003; Renshaw, et al., 2012). Creating individual and/or group engagement in learning experiences through the manipulation of specific performance constraints enhances the representativeness of an experience. This is so because the inclusion of situation-specific information simulates the demands of a competitive performance environment (Pinder, et al., 2011b; Pinder, et al., in press). Based on this premise, to facilitate the holistic development of expertise, performers should be immersed in learning environments that challenge and stimulate both physically and psychologically to coincide with the constraints of prospective performance environments (Davids, et al., 2013; Renshaw, et al., 2012).

For example, rather than allow an athlete to practise shots on a driving range, a coach might walk alongside a trainee golfer, creating specific ‘vignettes’ (e.g., 1 shot behind with one hole to play or 2 shots ahead in the same situation) to simulate competitive performance conditions under which a learner might need to adapt their golf shots (e.g., play more conservatively or take more risks). Some previous work in team sports research has incorporated vignettes into the design of practice and performance tasks to investigate how manipulating situational constraints might influence emergent behaviours in athletes. In basketball 1v1 sub-phases, the manipulation of instructional constraints to simulate competitive performance conditions was found to influence the specific intentions and emergent behaviours of attacking players (Cordovil et al., 2009). In that case game time and score-based scenarios were implemented to encourage players to experience adopting risk-taking, conservative, or neutral strategies that might emerge in competitive game play. Similarly, in football, 1v1 attacker-defender dyads, located at different locations on the field of play (by manipulating distance to the goal area) were found to constrain how attacking and defending players interacted with each other (Headrick et al., 2012). Providing contextual information through vignettes engaged the players in the task by specifying goals or objectives that simulated typical game situations for each field position.

Further work originating from elite sport programmes has discussed the importance of designing practice tasks that effectively replicate competitive conditions for athletes. An example is the development of the ‘Battle Zone’ in cricket as an alternative to traditional, decomposed, net-based or centre wicket batting and bowling practice (Renshaw, Chappell, Fitzgerald, & Davison, 2010). The Battle Zone concept combines a regulation cricket pitch with a downscaled netted field area to increase involvement and intensity for all players, compared with full sized centre wicket practice. Vignette-based tasks such as the Battle Zone maintain the critical performer-environment interactions while also affording coaches the opportunity to manipulate specific performance constraints to physically and psychologically engage batters, bowlers and fielders simultaneously (Renshaw, Chappell, et al., 2010; Renshaw, et al., 2012). Tasks such as the Battle Zone manipulate the space and time demands on players which is captured by the Game Intensity Index (GII) concept (Chow, Davids, Renshaw, & Button, 2013). The GII (pitch area in m^2/number of players) can be used in various team and invasion games to create game intensity representative of competition, compare types of games, and cater for different levels of expertise.

Other work in the sport of springboard diving studied the practice methods of athletes from an elite-level squad (Barris, et al., in press; Barris, Farrow, & Davids, 2013). In these studies, elite divers were observed to baulk (preparation occurs but divers do not leave the board) during practice when the preparation phase was perceived as not being ideal for the performance of a selected dive (Barris, et al., 2013). This behaviour posed problems for performance in competitive events where baulked dives result in reduced scores from judges. In a planned intervention, divers were required to avoid baulking unless it was perceived that an injury might occur. Barris and colleagues (2013) reported no differences in movement patterns between baulked and completed dives under these new task constraints. However, quantitative analyses of variability within conditions, revealed greater consistency and lower variability amongst dives completed prior to the training program, and greater variability amongst dives completed after experiencing the training programme. It was concluded that divers should be encouraged to complete (where safe) all attempts to more functionally simulate competitive performance conditions. From an ALD approach, data suggested that under these practice task constraints, divers would be exposed more frequently to experiences in metastable regions where they needed to adapt physically and emotionally to perceptions of less than ‘optimal’ preparatory movements to enhance the acquisition of expertise. The elite springboard divers displayed greater consistency and stability in achieving a key performance outcome (dive entry) at the end of a twelve-week training program that increased their exposure to training with increased levels of functional movement variability. The data suggested that, after this intervention, they were able to adapt their movements in the preparatory phase and complete good quality dives under more varied take-off conditions. These results suggest some important practical implications for athletes in training and competition, improving training quality, reducing anxiety and enhancing feelings of self confidence (Barris, et al., in press)

3.4. Goals, achievement and emotions

An effective way to nurture the important relationship between perception, actions, intentions and emotions during the development of expertise in sport is to specify clear goals for particular tasks and time periods (Renshaw, et al., 2012). Designating clear goals during practice aids performers by distinguishing when they should be encouraged to explore situational constraints to develop competence (mastery goals), or when performance is more about being compared with others (performance goals) (Elliot, 2005). Furthermore, performance approach goals refer to a performer taking the opportunity to demonstrate competence (approach success), compared with avoidance goals where a performer attempts to avoid displaying failure (Elliot & Church, 1997). This idea exemplifies the significance of a metastable performance region where variability in actions and emotions is expected to provide critical feedback about how closely the current intrinsic dynamics of a performer and task demands are matched. For example, in Judo combat, self-reported goal involvement states were found to frequently fluctuate based on the interaction between the two competing Judokas (Gernigon, d'Arripe-Longueville, Delignieres, & Ninot, 2004). This finding suggests that physical performance cannot be completely understood without reference to the goal orientation of individuals, which has clear implications for the design of affective learning environments.

Finally, the perceived success or failure emerging from the interaction between a performer's intentions and situational constraints has the potential to influence self-efficacy and levels of confidence (Renshaw, et al., 2012). A pertinent example of changes to self-efficacy based on previous performances in sport is a study of athletic sprint performance (Gernigon & Delloye, 2003). Manipulated time feedback, in the form of success or failure relating to individualised target times, was given to performers after they completed 60-metre sprint trials. As expected, success influenced self-efficacy positively, while failure constrained this psychological state negatively prior to the next sprint trial. These findings demonstrate how the self-efficacy of performers can be quite fragile and easily destabilised, posing challenges for the balance of experiencing success and failure during learning and performance tasks. From an affective learning design approach, monitoring the self-efficacy and overall emotional state of individual performers in relation to actions is critical to understand how future tasks should be designed, and what goals should be set to effectively develop expertise.

4. Summary

This position paper has discussed the key role of emotions during learning experiences and how they might be integrated with the cognitions, perception and action of individuals in learning design for the development of expertise. Founded on ecological dynamics principles, previous work has conceptualised and advocated a representative learning design for effective development of skill and expertise in sport. To enhance the understanding and application of this approach and highlight the importance of emotions in learning we have introduced an integrated concept of affective learning design with potential scope for future theoretical modelling. From an applied perspective ALD advocates designing learning environments at an individualised scale, implementing vignettes or scenarios to provide context to tasks, and clearly identifying goal orientations to nurture the development of performers. It is envisaged that considering ALD will enhance the development of performers who know what it feels like, what to do, and how to do it. This principled explanation of how affect, cognition, and action interact provides implications for the design of holistic learning environments that underpin the development of expertise in sport.

Highlights

- The role of emotion in the pursuit of expertise in sport has often been neglected.
- Performers should be immersed in learning environments that challenge and stimulate.
- Psychologists need to accurately simulate potential emotional and cognitive contexts.
- Principles of Affective Learning Design pose implications for developing sport expertise.

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