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Mindfulness and its relevance for sports coaches adopting nonlinear pedagogy

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Abstract

Nonlinear pedagogy is an approach for structuring skills acquisition that is underpinned by dynamical systems theory and ecological psychology approach of motor behaviour. Given that nonlinear pedagogy calls for a different set of coaching strategies that departs from the traditional prescriptive approach, a heightened level of mindfulness—underpinned by attention/awareness and acceptance (Bishop et al., 2004)—on the part of coaches may be particularly pertinent for facilitating this creative and learner-centred approach. In this paper, the relevance of the mindfulness construct will be discussed in association with the need for coaches implementing nonlinear pedagogy to (a) develop sensitivity to the dynamics of the movement system, (b) be open about the impending variability and creativity in a learner's behaviour, and (c) accept learners for who they are. The case for how coaches with heightened mindfulness might be better apt to accomplish the above is put forth. Some suggestions for future work in this area are also suggested. In line with the adoption of a complex systems perspective in skills acquisition, perhaps it is not too far-fetched to consider a coach's level of mindfulness during the coaching session as an important control parameter to a larger movement system that determines the learner's success of skill acquisition.

Keywords: systems thinking, chaos theory, sport psychology, motor behaviour, motivation

Mindfulness and its relevance for sports coaches adopting nonlinear pedagogy

Interests in mindfulness has increased exponentially over the last 20 years (Van Dam et al., 2017). Given that mindfulness, or the act of paying attention to the ongoing moment non-judgementally (Kabat-Zinn, 1990), can be readily performed by most, at least momentarily, the mindfulness state can be thought of as a universal psychological quality that every functioning human can manifest to some extent. Though of a lesser coverage in the literature, the case for sports coaches to develop mindfulness had been advocated (Baltzell, McCarthy, & Greenbaum, 2014), and findings from a previous study by Longshore & Sachs (2015) also supports such a recommendation. A well-known case-in-point in professional sports coaching where mindfulness has been adopted with much success and benefits is the case of Phil Jackson, former head coach of the Chicago Bulls (Jackson & Delehanty, 1995). In particular, Jackson concluded that by creating a team environment centred on selflessness and compassion, and supported by mindfulness practice, his players became more attuned with each other, and that in turn benefits the quality of play (Jackson & Delehanty, 1995, p. 4-6).

In this paper, the relevance of mindfulness for sports coaches implementing nonlinear pedagogy, a form of coaching pedagogy based on ecological dynamics (Chow, Davids, Button, & Renshaw, 2016), is presented. Nonlinear pedagogy has received some attention across various skill learning situations over the recent years (e.g., Lee, Chow, Komar, Tan, & Button, 2014; Körner & Staller, 2017; Seifert et al., 2014), and also has been touted as an approach for developing twenty-first century competencies (Lee, Chow, Button, & Tan, 2017). Appreciating it in relation to Mosston's spectrum of teaching styles, which Kirk and colleagues categorised as direct, task, reciprocal, guided discovery and problem-solving methods (as cited by Cassidy,

Jones & Potrac, 2009), nonlinear pedagogy is an approach that characterises guided discovery and problem-solving while placing less emphasis on direct instruction (Lee et al., 2017). Given that nonlinear pedagogy calls for a different set of coaching strategies that departs from the traditional prescriptive approach, a heightened level of mindfulness—underpinned by attention/awareness and acceptance (Bishop et al., 2004)—on the part of coaches may be particularly pertinent for facilitating this creative and learner-centred approach.

A brief review of background on nonlinear pedagogy and mindfulness is presented followed by discussions of how mindfulness can be relevant for coaches adopting nonlinear pedagogy. Particularly, the need for coaches implementing nonlinear pedagogy to (a) develop sensitivity to the dynamics of the movement system, (b) be open about the impending variability and creativity in a learner's behaviour, and (c) accept learners for who they are, are elucidated. The case for how coaches with heightened mindfulness might be better apt to accomplish the above is also put forth. The proposed conceptualisation is depicted in Figure 1. Some suggestions for future work in this area are also suggested.

Nonlinear pedagogy

Nonlinear pedagogy is an approach for structuring skills acquisition that is underpinned by a dynamical systems approach of motor behaviour (Chow et al., 2016; Lee et al., 2014). Briefly, as opposed to the motor programme perspective, which underpins the more commonly known top-down and prescriptive approach in skills instruction, the dynamical systems approach views the movement system as a set of interacting subsystems whose behaviour is subjected to constraints applied to the system (Davids, Button, & Bennett, 2008). Given that the movement system is viewed as a complex adaptive system (Chow et al., 2016), this implies that therein lies non-proportionality in its cause and effect relationships among the sub-systems. To this end, the

‘nonlinear’ in nonlinear pedagogy refers to the potential for the ‘right tweak’ to the system to result in massive effect, such that “small changes to the task constraints, such as information present or technical changes to equipment, may result in significant changes in learners’ behaviours” (Chow et al., 2011, p. 190). Therefore, the goal for the coach adopting nonlinear pedagogy is to recognise and to implement the appropriate constraints to the movement system in order to effect the desired nonlinearity in the learning progression.

In addition to understanding nonlinear pedagogy through the dynamical systems perspective, it is also important to note the other associated theoretical foundation – ecological psychology, or more specifically, ecological dynamics, when performer–environment interactions are considered (Chow et al., 2016). Fundamentally, the movement system is viewed as an open system, where it is implied that there is constant flux of information flow between the learner and environment during movement (Davids et al., 2008), underpinning reciprocity of information and movement, i.e. information–movement coupling. To implement nonlinear pedagogy well, it is important to appreciate the ongoing interactions between the learner and environment so that the appropriate constraints can be implement.

Although the nonlinear pedagogy approach is undergirded by abstractions from dynamical systems theory and ecological psychology, there are practical pedagogical principles for implementing nonlinear pedagogy (Chow, 2013; Chow et al., 2016; Lee et al., 2014). In brief, they are: (a) representative learning design (i.e., ensuring that practise tasks are representative of the demands in actual sports); (b) developing relevant information-movement couplings (i.e., helping learners to use environmental information effectively for movement control); (c) manipulation of constraints (i.e., effecting change through adjusting identified factors that are critical for performing the target movements); (d) ensuring functional variability (i.e., leveraging

on exploratory learning which brings about movement variation and consequent personalised movement solutions); and (e) reducing conscious control of movement (i.e., lowering reliance on the cognitive processes during practice in order to exploit natural self-organization of skill).

To sum up, it is important to appreciate that the pedagogical principles of nonlinear pedagogy are theoretically grounded in dynamical systems theory and ecological psychology. Nonlinear pedagogy involves structuring learning tasks that are representative of real-game situations (e.g., practising with defenders in soccer dibbling), and often such task arrangements would aid the learner in developing relevant information–movement couplings. As a complex system view is applied in appreciation of the emerging movements, it is important for coaches to *develop sensitivity to the dynamics of the movement system* so that task constraints, informed by clear understanding how such constraints may affect resulting behaviour, can be more purposefully implemented. For example, while learner undergoes soccer dribbling practice, there is a need for the coach to pay attention to the inherent dynamics of the interacting relations between learner's capability, size of playing area, and defender's behaviour. Such appreciation can be important for implementing further constraints (e.g., new task rules) to the learning task. Further, in nonlinear pedagogy, movement variability is viewed as purposeful for skills acquisition. Constraints or learning tasks prescribed serve to intentionally generate movement variability such that the accompanying exploratory process undertaken by the learner facilitates skills development. For example, asking the learner to dribble a rugby ball instead of a usual soccer ball could cause increased movement variability in the dribbling action that may be necessary for exploration towards an optimal movement solution in some cases. Therefore, coaches implementing nonlinear pedagogy should *be open about the impending variability and creativity in learner's behaviour*, rather than dismissing it as a wastage of time for not practising

to replicate the model movement actions. Lastly, it is also believed that there is value in reducing conscious control of movement. Therefore, instructional strategies in nonlinear pedagogy tended to be targeted at helping learners learn without excessive conscious attention to the body and action. In the case of soccer dribbling, the coach would limit his/her prescriptive verbal instructions and corrective feedback on the dribbling action which would invariably be increasing the learner's conscious control of movement rather than reducing it. Instead, a task constraint that requires the learner to fixate his/her visual attention externally on the relevant cues on the defender and/or surrounding may be used instead to facilitate dribbling practice. To this end, the willingness to *accept learners for who they are*, capable of self-organizing their actions could be integral to actualising learner-centeredness and leading to more precise adjustment of constraints for the learners' benefit.

Mindfulness

While the definition of mindfulness receives ongoing revision and deliberation (e.g., Bishop et al., 2004; Carmody, 2009; Dreyfus, 2011; Gethin, 2011; Lindsay & Creswell, 2017), at its core, mindfulness can be thought of as a psychological quality that pertains to the application of attention on purpose towards the ongoing occurrences nonjudgmentally (Kabat-Zinn, 1990). Perhaps the Zen quote, reportedly by Master Ummon: "If you walk, just walk. If you sit, just sit; but whatever you do, don't wobble" (Humphreys, 1994, p. 33), epitomises this description of mindfulness very aptly. In applying the above instruction, one stays with the present moment, experiencing whatever arises without making judgement. It may be fairly easy to follow this instruction momentarily whenever reminded, but to repeatedly adhere to this instruction without reminders and be mindful most of the time can be challenging.

Mindfulness can be explained in terms of the extent to which one remembers to be

focusing on the present moment nonjudgmentally, and is arguably a mental skill that can improve with practise. Specifically, Lindsay and Creswell (2017) propose that mindfulness comprised of both attention monitoring and acceptance skills, with beginners typically starting with attention monitoring skills before progressively developing acceptance skills. Methods of practicing the attention monitoring aspects of mindfulness skill may include sitting quietly and focusing on one's breathing repetitively, mentally scanning one's body parts, or walking mindfully, to name a few. Acceptance skills can be strengthened in the midst of these practices as one modifies the way one relates to present-moment and affective experiences, supported by nonjudgment awareness (Lindsay & Creswell, 2017).

Typically, mindfulness training involves prolonged periods of practice for multiple days, weeks or even months as implemented in established training programmes such as the Mindfulness-based Stress Reduction Program (MBSR: Santorelli, Kabat-Zinn, Blacker, Meleo-Meyer, & Koerbel, 2017). For those looking for specific support in sport performance, mindfulness skills can also be learned via programmes offered by sport psychologists (e.g., Gardner & Moore, 2007; Kaufman, 2017). Besides these formal programmes, there is also an increasing trend in the use of mobile applications (e.g., http://www.headspace.com) for guiding individuals in mindfulness practice (Mani, Kavanagh, Hides, & Stoyanov, 2015; Plaza, Demarzo, Herrera-Mercadal, & García-Campayo, 2013). These options, alongside with instructions found on the internet and in available mindfulness guidebooks, serves as avenues for individuals to embark on mindfulness practice.

While the mindfulness construct has been examined in sports (e.g., Birrer, Röthlin, & Morgan, 2012), research on mindfulness training for sports coaches is particularly limited compared to research on mindfulness training for athletes. Thus far, the only published study

examining effects of mindfulness training for sports coaches was based on work undertaken by Longshore and Sachs (2015). Longshore and Sachs (2015) implemented a 6-week programme modelled after MBSR for sports coaches named Mindfulness Training for Coaches (MTC) programme, which comprised mindful breathing and body awareness exercises, open awareness and loving-kindness practices adminstreed through initial 1.5hr of face to face instruction and average of 20 minutes of home practice. Adopting a wait-list controlled experimental design, Longshore and Sachs showed that their intervention was efficacious in decreasing coaches' anxiety and increasing emotional stability. Qualitative data also affirmed that mindfulness training increased coaches' awareness of themselves, such as being more in tune with one's initial reactions (Longshore & Sachs, 2015, p. 128) and ability to see the big picture (Longshore & Sachs, 2015, p. 129). More interestingly, coaches were also aware of the positive impact of such awareness on their interactions with athletes and coaching behaviours. For example, one of the participants related how mindfulness training led to abstinence of yelling at a player (Longshore & Sachs, 2015, p. 129) and another spoke about how being able to "reset and compartmentalize" from other issues in life (Longshore & Sachs, 2015, p. 129) is important for giving athletes their best experience in the session. Lastly, there were indications that coaches were able to relate to the two themes of mindfulness: awareness and acceptance, and why they matter in coaching (Longshore & Sachs, 2015, p. 129).

Despite the seemingly lack of direct evidence to suggest that mindfulness training benefits sport coaches, other than Longshore and Sachs's (2015) work, related works on the importance of mindfulness were found in the context of other instructional and mentorship roles. For example, Roeser, Skinner, Beers, and Jennings (2012) brought forth the case for mindfulness training to be beneficial for promoting teachers' "habits of mind" (e.g., tolerance for uncertainty, attentional

focus, cognitive flexibility, and emotional regulation). They suggest that it can in turn enhance teachers' occupational health, well-being, and capacities for creating and sustaining supportive relation with students and classroom climate. A latter systematic review across 13 eligible studies reported by Emerson, et al. (2017) also conclude that mindfulness training for teachers accounted for the intermediary effect of emotion regulation, which could further cascade to more conducive classroom environment and pupil well-being. In the case of executive coaching, Passmore and Marianetti (2007) highlighted four specific ways mindfulness can be useful to coaches. First, mindfulness practice prior to mentoring session can be practiced in preparation for the mentoring session, which can serve to eradicate any possible psychological negativity leading up to the meeting on the coaches' part. Second, mindfulness helps coaches maintain focus during the session. Third, mindfulness helps coaches to remain emotionally detached, preventing personal emotions from affecting the coaching process. Lastly, if coaches are familiar with mindfulness practice, they can introduce mindfulness to their clients as a mental skill for coping with challenges. Taken together, these deliberations points to the relevance of mindfulness skills for those assuming instructional and mentorship roles, which could well include sport coaches adopting nonlinear pedagogy.

Mindfulness for facilitating nonlinear pedagogy

Developing sensitivity to the movement system. Nonlinear pedagogy involves online adaptations to task design on the coach's part in response to emergent behaviour during a session (Chow, et al., 2016, p. 148). As earlier alluded, the application of task constraints is paramount to the success of nonlinear pedagogy. The coach can only make the necessary adjustment if he/she is sensitive to the changes or dynamics of the session. Here, a brief application of mindfulness skills momentarily—self-regulation of attention—may increase one's awareness of the situation

as well as to help coaches re-focus (Longshore & Sachs, 2015). In particular, by adopting an open awareness of the learner's behaviour in relation to the task and environmental constraints on purpose and suspending any judgement temporarily, mindfulness skills can serve to block off potential nagging inner dialogue preventing the coach from seeing emergent behaviours of the movement system. Coaches, after all, are susceptible to the psychological stress associated with coaching and beyond (Fletcher & Scott, 2010); therefore, if coaches are unable to find a space to appreciate the movement system, then any adjustments made to the task constraints could be misinformed. As such, it is proposed that a coach skilled in mindfulness strategies would be in a better position to appreciate the nuances of the emergent behaviour for further action than one who is mindless and oblivious to the system dynamics.

Heightened mindfulness may also be creating the conditions for coaches to access intuition (Dane, 2010, 2011; Gee, 2013; Remmers, Topolinski, & Michalak, 2015), which could in turn result in more effective implementation of task constraints. The coach often has to adjust the task constraints quickly based on the emergent behaviour on the ground. The ability to do this well would be somewhat akin to the advanced player assimilating the invariant information from the situation and acting on the information effectively in the game setting (Davids, et al., 2008). Similarly, the coach must be able to pick up the affordance provided by the unfolding events during practice, and to act upon them accordingly. Very often, these cues are represented in a higher order dimension, with multiple factors interacting in a complex manner. For example, the coach may have to consider the abilities and progress of all the members practising in the soccer passing drill, alongside with the existing task and environment constraints to provide adjustment to the subsequent practice task optimally. Given the complexity and time pressure, it is possible that some coaches are able to intuitively adjust the task constraint effectively for the

given situation while others cannot. Although empirical evidence supporting the links between mindfulness and intuition is still lacking, several scholars have begun to explore and discuss this link (McNeill & Gee, 2013; Remmers et al., 2015). One idea put forth by Dane (2010, p. 1008) that has relevance here (given the need to process information dynamically in nonlinear pedagogy) is that intuitions can be thought of as non-consciously held cognitive structures which matches with environmental stimuli. Mindfulness, with its particular characteristics in attuning to non-consciously-based phenomena, could make intuitions more recognisable as a result (Dane & Pratt, 2009).

Openness about impending variability and creativity in learners' behaviour. Departure from the need to replicate the model movement is a key characteristic of nonlinear pedagogy (Chow et al., 2016). Given that the prescriptive approach has been the *de facto* approach in skills instruction and that coaches are more familiar with direct instruction, demonstration, feedback and repetitions processes (Moy, Renshaw, & Davids, 2014), the absence of reliance on model movement can be somewhat unsettling for coaches adopting the nonlinear pedagogy. The case-in-point is that coaches are expected to help learners master skills, and most conservative coaches would likely play it safe by structuring repetitive drills for mastering the desired actions. Recent studies illustrating presence of degeneracy in skill development suggest that believing that there must be only one ideal movement solution is a common misconception to be challenged (Lee, et al. 2014). In contrast, nonlinear pedagogy take a more exploratory stance by adopting non-traditional learning tasks (e.g., practising with smaller rackets) or more pronounced movement variability during practice, to leverage on the inherent characteristics of degeneracy. For coaches adopting nonlinear pedagogy, attitudinal openness towards a seemingly less structured and nonlinear approach would be an important catalyst.

The practice of mindfulness concerns directing one's attention towards the unfolding moment nonjudgmentally (Kabat-Zinn, 1990). The deepening of such practices is said to support transformational learning "through a number of mechanisms including attending to the present moment, assuming a non-judgmental attitude when presented with new and potentially challenging information, becoming fully aware of our embedded experience, staying engaged with challenging life events, and discovering how to disidentify with our thoughts." (Barner & Barner, 2011, p. 349). In the case of the coach adopting a nonlinear pedagogy approach, mindfulness could be a form of support for the coach attempting to be open about what is seen at the session (e.g., more variability in performance, seemingly irrelevant practice tasks) that defies previous deeply entrenched enculturation, or what Moy et al. (2014) and Moy, Renshaw, Davids and Brymer (2016) described as 'custodian teaching beliefs'. As it is expected that learners would undergo phase transitions (periods of instability) while the exploratory process is undertaken (Davids et al., 2008; Liu, Mayer-Kress, & Newell, 2006; Rein, Davids, & Button, 2010), the coach adopting a nonlinear pedagogy has to be tolerant about the impending variability and perceived lack of progress. To this end, Longshore and Sachs (2015) showed that mindfulness intervention can help coaches develop the acceptance attitude for accepting situation for what it is and responding differently (p. 130). At the macro level, given that past research suggests that mindfulness practices can be efficacious in helping people weaken previous habits (e.g., Chong, Kee, & Chaturvedi, 2015), the development of mindfulness disposition could potentially lead to coaches' increasing receptiveness of nonlinear pedagogy, breaking away from 'custodian teaching beliefs'.

Additionally, because mindfulness has been associated with creativity (Bochun, 2011; Hanson, Parker, & Collinson, 2017; Lebuda, Zabelina, & Karwowski, 2016; Ostafin & Kassman,

2012), it is plausible that coaches' heightened appreciation of creative processes through their mindfulness experience may be important for implementing nonlinear pedagogy. Briefly, a meta-analysis by Lebuda et al. (2016) concluded: "It is very likely that such mindfulness-based interventions, especially ones based on open-monitoring meditation, may be beneficial for creative abilities as well as for creative self-concept." (p. 25). After all, in other creative education settings, instructors can be found to be responding creatively to the unfolding events within the session, such as in the case of a predominantly constructivist studio art and design pedagogy (see review by Sawyer, 2017). It is important, therefore, to consider the need for coaches adopting nonlinear pedagogy to recognise the importance of creativity and perhaps to develop it through mindfulness practices. There are plenty of occasions where the coach's role in nonlinear pedagogy is to structure movement problems for learners to solve; thus, creativity on the coach's part can be useful. At the very least, the mindful appreciation of a movement system as a creative and beautiful phenomenon for its own sake rather than for any utilitarian reason[1] (Poincaré, 1914) could be useful for convincing coaches that variability observed in practice can be part of a huge creative process to be respected.

Accepting learners for who they are. Nonlinear pedagogy as a constructivist approach has a strong learner-centred focus (Chow, 2013), and learners' individuality is accordingly appreciated. Primarily, the approach recognises that organismic constraints such as individuals' past experience, skills and physical and psychological attributes are important to consider when implementing task constraints. In the prescriptive approach, the implicit expectation is for learners to acquire the target skill through practice and instructions regardless of individual differences, and the coach would typically provide standardised demonstrations and verbal instructions for the masses to model. In nonlinear pedagogy, however, given the reliance on

applying suitable task constraints, the coach makes an extra effort to fine-tune the task constraints for different learners wherever appropriate. For instance, the coach may decide to allocate a lighter implement for someone who appears weaker in order to alter the task constraints more appropriately.

Certainly, such a learner-centred focus necessitates a sensitive awareness of learners' characteristics and effort on the coach's part to connect with the learner. Here, a heightened degree of mindfulness could serve to support the learner-centred instructional style. Roeser, et al. (2012) noted that teachers' cultivation of habits of mind (i.e. tolerance for uncertainty, attentional focus, cognitive flexibility and emotion regulation) associated with mindfulness supports greater occupational health, well-being and engagement of the teacher, which further fuels their support in the formation of positive dyadic teacher–student relationships. Longshore and Sachs (2015, p. 129) also noted similar enhancement to coach–athlete interactions in their study due to mindfulness practice, in that a greater appreciation of connection to others and ability to focus more on others had been reported.

The associations between mindfulness and various types of interpersonal relations have been the subject of previous research (Barnes, Brown, Krusemark, Campbell, & Rogge, 2007; Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008; Iida & Shapiro, 2017; Pratscher, Rose, Markovitz, & Bettencourt, 2017). Given such interest and relevance, the term 'interpersonal mindfulness' has recently been coined to describe the "capacity for individuals to be mindful during their interpersonal interactions" (Pratscher et al., 2017) and conceptualised as "involving an awareness of self and others, accompanied with the qualities of a non-judgmental and nonreactive presence". Mannion and Andersen (2016, p. 443) also suggested that a coach who is interpersonally mindful "would be more likely to observe and take in the internal states of the

athlete, more accurately represent and feel what the athletes feeling, come to know what the athlete's knowing, and better connect with an attuned to the athlete". Drawing from their experience as therapists, they also described how such mindfully authentic and empathetic projections can lead to resonance between the coach and the athlete, which they described as 'therapeutic' (Mannion & Andersen, 2016, p. 444). Taken together, it would be worthwhile for coaches implementing the nonlinear pedagogy approach in pursuit of learner-centeredness to consider adopting mindfulness strategies to improve interpersonal relationships with learners. Currently, there is ongoing discourse on how the satisfaction of basic psychological needs of autonomy, competence and social relatedness (self-determination theory: Ryan & Deci, 2000) can be facilitated by nonlinear pedagogy (Chow, 2013; Moy, et al., 2016). It is timely to consider how interpersonal mindfulness in particular could further support these basic psychological needs within the context of nonlinear pedagogy implementations.

Summary and Conclusion

The case for the relevance and value of mindfulness for sports coaches adopting nonlinear pedagogy is presented (see Figure 1). In essence, the main argument is that a coach with a strong mindfulness disposition and/or has competent mindfulness skills would be in a better position to deploy nonlinear pedagogy. First, as success in nonlinear pedagogy is fundamentally reliant on the proper application of task constraints, coaches deploying nonlinear pedagogy should have a developed sensitivity to the dynamics of the movement system in question. Mindfulness, centred on attention and awareness towards the ongoing experience would likely predispose the coach to develop sensitivity towards what is going on during the practice session. The possibility of the coach accessing intuition through mindfulness, much akin to athletes reading the affordances for action, is also mooted. Second, nonlinear pedagogy departs from the traditional prescriptive

approach and, therefore, receptivity to the less predictable behaviour and variability in performance at the practice session is necessary. A coach with heightened mindfulness or one that can apply mindfulness more readily would likely experience acceptance and openness of the ongoing moment more frequently, and there could be carry over effects to the coaching settings. Third, nonlinear pedagogy is a learner-centred approach, therefore, the appreciation and acceptance learners for who they are is integral to the success of this approach. Coaches who are more mindful, especially in terms of interpersonal mindfulness, could be gaining deeper insight about their learners, which in turn leads to better adjustments to the task constraints.

Given the interests in both mindfulness and nonlinear pedagogy in sports and human movement studies, there is much room for further research and discussions on the relevance of mindfulness for coaches adopting nonlinear pedagogy. Future intervention studies in the likes of Longshore and Sachs' (2015) work could serve to reveal impact of multiple-week mindfulness training programme on coaches' adoption of nonlinear pedagogy and effects on learners. The research question could be whether coaches who received training in mindfulness would be better adept at implementing constraints to shape learning, be actively facilitating movement variability and creative problem solving, and have better interactions with learners. Further investigation might examine how such coaches facilitate learners' development of mindfulness, well-being and 21st century skills through nonlinear pedagogy. The question on how learner's mindfulness facilitates skills acquisition through nonlinear pedagogy could also be pertinent. Finally, conceptual discussions related to Zen concepts and their relevance for skill acquisition (Light & Kentel, 2015), performance and coaching (Jenkins, 2008) are worthy of further pursuits as renowned coaches like Phil Jackson (Jackson & Delehanty, 1995) had benefited from a mindful coaching approach rooted in the Eastern philosophy.

The current contribution merely scratches the surface of the potential relationship between mindfulness and nonlinear pedagogy. Nevertheless, the three aspects discussed in this paper are suitable starting points for nonlinear pedagogy scholars and coaches to consider. The idea of mindfulness should not be entirely foreign for sports coaches given that most coaches would have some knowledge and experience with mental skills practices; thus, the adoption of mindfulness as a personal practice should not be difficult. Those who need some initial guide to practise mindfulness could find the two meditation exercises provided by Gee (2013) or mobile applications such as Headspace (http://www.headspace.com) very useful, before considering deepening mindfulness practice through longer programmes like MBSR (Santorelli, et al., 2017). In closing and in line with the adoption of a complex systems perspective in skills acquisition (Davids et al., 2008), perhaps it is not too far-fetched to consider a coach's level of mindfulness during the coaching session as an important control parameter that could determine the learner's success of skill acquisition, considering that the coach can be part of the open movement system.

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Footnotes

[1] The following quote by Poincaré (1914; p. 22) epitomises this point well: "The scientist does not study nature because it is useful to do so. He studies it because he takes pleasure in it, and he takes pleasure in it because it is beautiful. If nature were not beautiful it would not be worth knowing, and life would not be worth living. I am not speaking, of course, of the beauty which strikes the senses, of the beauty of qualities and appearances. I am far from despising this, but it has nothing to do with science. What I mean is that more intimate beauty which comes from the harmonious order of its parts, and which a pure intelligence can grasp."

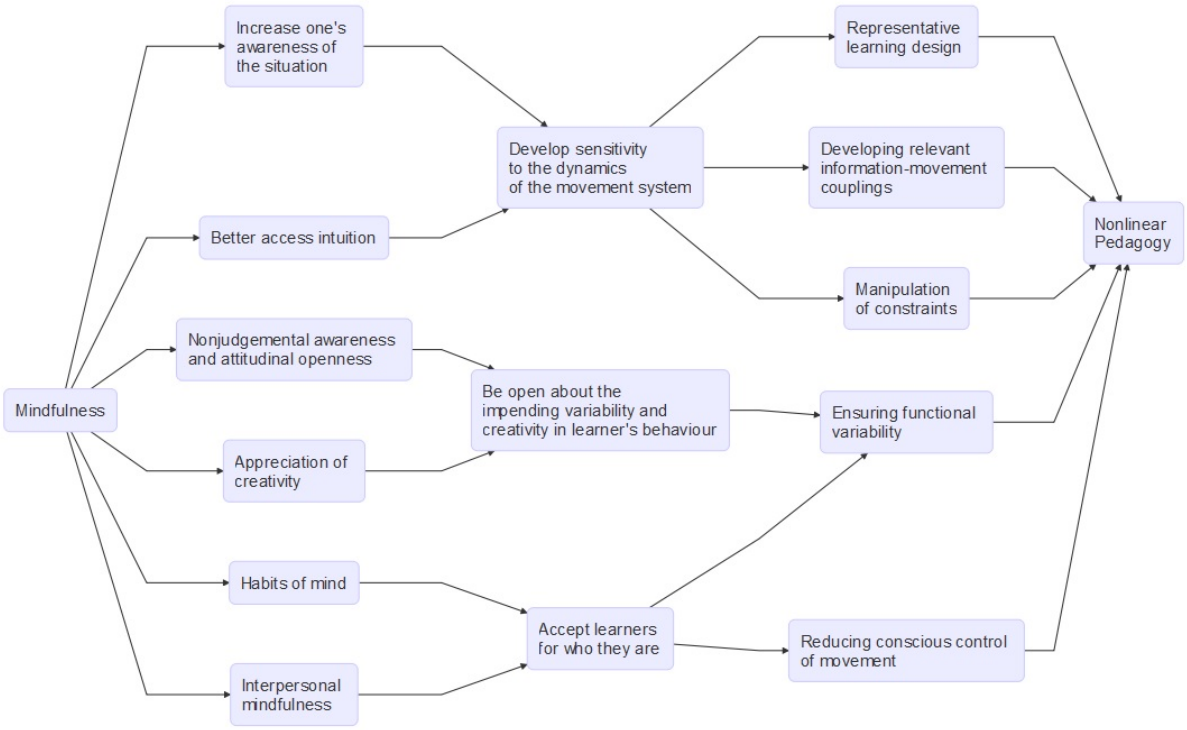

Figure 1. Conceptual map for the proposed relevance of mindfulness for sports coaches adopting nonlinear pedagogy.