Being Water: how key ideas from the practice of Bruce Lee align with contemporary theorizing in movement skill acquisition

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Abstract

The purpose of this insight article is to explore the relevance and value of some of Bruce Lee's ideas that influenced his coaching philosophy, (re)viewed through the lens of contemporary discussions in movement skill acquisition. To achieve this aim, we highlight empirical and anecdotal examples of many of the important concepts that support Bruce Lee's interpretation of martial arts, *Jeet Kune Do* (JKD). We contend that Lee's approach to coaching and skill refinement was deeply aligned with ideas that underpin an *ecological dynamics* framework. Central to the philosophy of Bruce Lee and JKD is the need for coaches, practitioners, and athletes to embrace and express more water-like adaptability throughout their practice. Examining the various, nuanced insights of Bruce Lee, we can observe many practical lessons which have stood the test of time, remaining highly applicable to athletes of today seeking to move skillfully in sports.

Keywords:

Ecological dynamics, information-movement coupling, affordances, skill adaptation, martial arts, representative learning design

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Introduction

Skill acquisition is an essential challenge for coaches in sports, with a variety of theoretical frameworks available to underpin practice designs (e.g., see Williams, Davids, & Williams, 1999). More contemporary ideas in skill acquisition, from an ecological dynamics perspective, emphasize the diversity of sport training experiences, the valuable role played by functional variability in acquiring movement coordination, and a holistic perspective of the relationship between brain and behavior (Button et al., 2020; Chow et al., 2022). Ecological dynamics sustains a scientific approach to studying the behaviors of neurobiological systems, especially the processes of action, perception, and cognition (Seifert & Davids, 2015), and considers athletes and sports teams as complex adaptive systems, examining the emergence of sports performance at the level of the performer-environment relationship. Within this contemporary view of skill acquisition, *athlete-environment interactions* are placed at the core of practice task designs with the goal of helping players increase the development and enrichment of reciprocal functional relationships in performance contexts (Chow et al., 2016; Yearby et al., 2022). This enrichment process has been termed 'skill adaptation' (Araújo & Davids, 2011). But are these ideas so contemporary? Here, we discuss the alignment of ideas on skill adaptation with the philosophy and practice of Bruce Lee. He was an expert martial arts athlete who played a prominent role in popularizing and coaching martial arts, becoming a legendary icon who has transcended both generations and fields. Bruce Lee emerged as a global superstar in the late 1960s and early 1970s before his unexpected death in 1973 at the age of thirty-two. When many think of Bruce Lee, they likely envision him performing in movies like *The Way of the Dragon* and *Enter the Dragon*, where he can be seen

taking on opponents with his dynamic style. A major aspect of Bruce Lee's fighting style was authenticity and ownership, which he displayed in his films and conveyed in his teachings.

The innovative thinking of Bruce Lee as a performer is evident when we venture into the depth of his work within martial arts, exploring the philosophies that guided his practice. Examining his coaching insights, we can observe many practical lessons which have stood the test of time, remaining highly applicable to athletes of today seeking to move skillfully in performance. Additionally, Bruce Lee's inspiration has motivated other researchers to consider the utility of *becoming more water-like* to improve skill performance in their own sport. For example, Noorbhai (2022) noted the importance of cricket batters being 'light on their feet.' In particular, Noorbhai states, 'This phenomenon is key, especially when facing bowlers of fast speeds (or when being approached by an attacking object; with cricket—the ball) and when transitioning between front-foot and back-foot shot selections.' This statement has an 'organismic asymmetry' in its applications, and we are offering a person-environment scale of analysis in our paper; however, Lee's influence is present (Davids & Araújo, 2010).

The purpose of this article is to explore the relevance and value of some of Bruce Lee's ideas that influenced his coaching philosophy, (re)viewed through the lens of contemporary discussions in movement skill acquisition. In this insight piece, we examine the relationships between Lee's documented philosophy of movement development and skill acquisition, as well as key concepts in ecological dynamics, using historical evidence and narratives from his contemporaries. We contend that his approach to coaching and skill refinement in the martial arts was deeply aligned with many of the contemporary ideas that underpin an ecological dynamics framework. In the following sections, we illustrate how his ideas can guide coaches looking to enhance athletes' skills and prepare them for competition. To achieve this aim, we will highlight empirical and anecdotal

examples of many of the important concepts that support his personal interpretation of martial arts, *Jeet Kune Do* (JKD).

Jeet Kune Do: Origins

> Jeet Kune Do favors formlessness so that it can assume all forms and since Jeet Kune Do has no style, it can fit in with all styles. As a result, Jeet Kune Do utilizes all ways and is bound by none, and likewise, uses any techniques which serve its end (Lee, 1975, p. 16).

In Hong Kong, Bruce Lee began studying martial arts, in the form of *Wing Chun*, at a young age under the guidance of gung fu master Professor Yip Man. Reportedly, Lee moved to America in 1959 because his parents felt as though he was getting into too much trouble, having frequent run-ins with law enforcement, and participating in street fights (Nguyen, 2020). Coincidentally, many of these initial experiences led to his exploratory pursuit of discovering and exploiting the most functional movement methods for martial arts combat. In Seattle, he attended the University of Washington and began to teach martial arts to fellow students on and around campus (McCormack, 2012). After seeing how various Japanese martial arts (e.g., karate and judo) had become popular in America, Lee elected to open his first martial arts school in 1963, the Jun Fan Gung Fu Institute, with the aspiration of helping people experience what Wing Chun could offer. Thus, Lee would teach anyone who had a sincere interest in learning martial arts, although teaching Chinese martial arts to non-Chinese individuals opposed tradition (McCormack, 2012; Nguyen, 2020).

Because of this perceived sleight to traditions, as explained by his wife Linda (McCormack, 2012), Bruce Lee was challenged to a fight by Chinese martial arts traditionalists in 1964, who sent martial arts master Wong Jack Man to face him. Lee was forced to defend his right to continue to teach his art to diverse students of all races – if he were to lose this fight, he would be required to

shut down his school and stop coaching immediately. Lee obviously had to accept this challenge willingly, putting his skills to the test against the elder master. McCormack (2012) recorded that, not long into the fight, Wong Jack Man proceeded to run around the room to evade Lee. After approximately three minutes, Bruce corralled him, got him to the ground, and forced Wong Jack Man to submit (note: the narratives around the fight were controversial). Though he should have celebrated this victory, as it meant he would be allowed to keep teaching martial arts to his diverse group of students without further disruption, Lee was distraught over the fight's outcome. Simply put, he felt he should have been able to win the fight much more efficiently. Lee realized that the classical ways of Wing Chun, which he had utilized up to that point, had limitations that he had to find a way to move past (the basis of skill adaptation ideas; Araújo & Davids, 2011). This documented story is important in understanding the development of Bruce Lee as a martial arts practitioner, as well as the eventual evolution of JKD. After that fight, Bruce Lee began to study a range of different martial arts and other combat sports, learning everything he could from these other influences to try to determine what could be adapted for his new, ever-growing, and innovative approach to martial arts. He began to advocate some key principles of performance, which underpinned his practice as a martial artist. These are worth exploring next to understand their alignment with contemporary theories of pedagogical practice for skill acquisition.

Transcending borders, absorb what is useful

In his creation of JKD, both in relation to becoming the most skilled martial arts practitioner he could be and with the philosophies he would adopt on his path towards self-actualization,[1] Bruce

1 Self-actualize: To be yourself and raise your human vibration, reaching for your greatest potential, expressing it outwardly as you move through life at the highest level possible, whatever that may be. Further, as Shannon Lee states in her book titled *Be Water, My Friend*, 'to self-actualize is to know oneself and express the uniqueness of oneself in the world with such skill and with such ease that, like water, it will flow naturally from you' (Lee, 2020, pp. 29-30).

Lee found applicable ideas that changed the way he saw the world, as well as the ways he behaved. The JKD mantra embodies the essence of the art and revolves around *using no way as way* and *having no limitation as limitation* (Lee, 2020, p. 17). We contend that if one were to adopt this approach to practice design, it would encourage coaches and sports practitioners to (a) seek out pertinent ideas from other disciplines; (b) put them to the test in their sphere of practice; (c) assess their integration and functionality in understanding skilled movement coordination; and (d) determine whether and how these ideas may have a place within one's professional practice. In his search for what could potentially apply in his personal interpretation of JKD, Bruce Lee frequently found himself immersed in the study of techniques and methods that underpin a diverse range of other martial arts (e.g., western-style boxing, karate, tae kwon do, jiu jitsu, and wrestling) and other sports and activities (e.g., cha-cha dancing, fencing, strength, and conditioning training) (McCormack, 2012). Additionally, Lee took his own advice and absorbed what was useful from other visionary philosophers like Alan Watts, Jiddu Krishnamurti, and Lau Tzu (Little, 1996). For example, from his study of boxing, he found footwork that is 'alive' and dynamic. Within dancing, he realized the importance of maintaining his authentic and expressive nature. From fencing, he realized that the adoption of certain body orientations, stances, and intentions would allow him to gain an advantage over opponents in pre-empting and intercepting their attacks. The more he stepped away from traditional practices and conventions of martial arts, the more he thought outside the box and fought to tear down the divide that often existed between specific styles and formats (McCormack, 2012). As we note later, these innovative ideas gained from his own experiential knowledge are deeply aligned with current theorizing in movement skill acquisition (e.g., Chow et al., 2022).

In some of his most famous words, Bruce Lee (1975, p. 3) summarized this core tenet of a JKD practitioner when he advised learners to 'Research your own experience; absorb what is useful, reject what is useless and add what is essentially your own.' To adequately do this and gain the most clarity and practical applicability through this process, it is imperative that someone's *cup is empty,* or we may risk having the experience clouded by traditional, dogmatic ways of thinking (Little, 1996, pp. 13-18). These insights eschew 'path dependence' (ideological inertia) in professional practice, encouraging the consideration of different ideas on learning and practice design from an ecological dynamics perspective to appropriately determine their applicability in different niches, like professional work with individual athletes and teams (Renshaw et al., 2022).

With his different approach to combat, it was not long until Bruce Lee began to garner attention across the martial arts community. In 1964, at the First International Karate Championships in California, he displayed his *one-inch punch* and put on an exhibition of fluidity and continuity in movement rarely seen before (Nguyen, 2020). For this reason, other elite fighters of the time, such as Chuck Norris, Joe Lewis, Gene LeBell, and Bob Wall, sought out Lee's guidance and traded ideas with him (McCormack, 2012). Other artists, such as James Garner, Steve McQueen, and James Coburn, as well as high-level athletes like Kareem Abdul-Jabbar, also gravitated toward Bruce Lee's teachings within JKD. As Lee explained on *The Pierre Berton Show* (1971), these individuals approached him to learn to express themselves through their movement. Influenced by deep thinkers like Alan Watts and others, coupled with his progressive thinking, Lee considered that being a martial artist could go beyond just combat. By applying philosophy with deep meaning in JKD, Lee found that one's pursuit of martial arts could potentially be life-changing. Decades after his death, individuals such as Kobe Bryant (basketball), Manny Pacquaio (boxing), Jon Jones (mixed martial arts), Dana White (mixed martial arts), and various movie stars, dancers, stuntmen,

and musicians routinely speak to the significant contribution that Bruce Lee and his ideas had in allowing them to achieve success in their respective performance fields (McCormack, 2012).

Alignment of Bruce Lee's ideas with key concepts in ecological dynamics

In his martial arts coaching as a JKD practitioner, Lee emphasized that (Little, 1996, p. xxvii) 'Man, the living creature, the creating individual, is always more important than any established style or system.' The emblem for JKD starts to further convey the ideas that Bruce Lee placed at the foundation of his coaching. It consists of the Yin-Yang symbol with two arrows circling around it, emphasizing the essence of relationships: the interdependent nature of all things, the constant flow and change of movement in life, and the *oneness* of apparent opposites and separate entities (Little, 1996, pp. 34-39). We contend that this focus is an indication that the coaching framework of Bruce Lee and JKD could be situated within an ecological dynamics framework. Although he may not have used the exact theoretical nomenclature of a contemporary ecological approach, his interpretation of JKD is an exemplar, prioritizing analysis of the performer-environment relationship (Araújo et al., 2006).

Evidence suggests that the emphasis on reciprocal relationships between the performer and the environment (Gibson, 1979), with the two emerging *as one with one another*, began to shape the methodological approaches used within JKD. Bruce Lee believed that training should look, feel, and unfold more realistically to how it might in competitive fights, particularly with a resisting opponent providing continuous challenges; he argued that doing so would be a more effective way to develop functional martial arts skills. Though he respected 'point fighters' (i.e., those competing in martial arts), he felt that additional full-contact sparring was actually needed against opposition when the realities of combat are truly captured. He argued that 'during the time of actual fighting,

one does not think of how to fight but rather, of the weakness or strength of the opponent, of possible openings and opportunities' (Lee, 1975, p. 189).

Lee's coaching ideas began to develop and are closely aligned with the notion of *representative learning design* (Pinder et al., 2011), a fundamental principle of *Nonlinear Pedagogy* that harnesses a learner-centered environment, prioritizes search and exploration and embraces nonlinearity in learning and development (Chow, 2013). Each of these ideas is a key tenet underpinning the practical application of an ecological dynamics framework. Representative learning design (RLD) views the need for individuals to be embedded within the *constraints* that emerge in competitive settings, where they can sample the informational variables used to regulate their behavior. As noted later, Bruce Lee seemed to have an intuitive understanding of a key idea for coaches: that the specific constraints facing an individual in practice may have a significant influence on skill acquisition. For example, a batter in baseball needs to face 'live pitching' in practice (from different players), with pitches being mixed and thrown across the zone, so they can gain valuable experience learning to detect information from the pitcher prior to the ball being released for use in regulating their movements to actualize relevant opportunities for action (i.e., affordances). Furthermore, coaches can manipulate the count, fielders, and baserunners, which are important constraints on their batting actions, contributing to meaningful experiences and a deeper contextual *knowledge of* the competitive performance environment (versus *knowledge about*) (for more elaboration, see Gibson, 1979; Sullivan et al., 2021).

This approach differs from traditional practices across various martial arts, which isolate technical skills for repetition. Training modalities such as kata (i.e., forms or choreographed patterns) are heavily invested in the repeated striking of an inanimate, static object such as a heavy bag, pad, or dummy as a common training means to 'perfect' movement execution for combat. However, as

Lee remarked, ‘Boards don’t hit back’ (*Enter the Dragon*, 1973). Technique repetitions of these kinds (i.e., kata or striking inanimate objects) are reductionist and analogous to practice activities in team sports, such as performing cone drills or rehearsing a movement in isolation (i.e., without an opponent present). At their core, these types of training methods not only separate the performer-environment relationship present within the competition but also violate representative learning design principles (Davids et al., 2008). Most importantly, the affordances of isolated technique repetition are different from those available in a competitive performance environment. *Affordances*, or the opportunities for action that are available in a specific performance context (see Gibson, 1979; for an update, see Chong & Proctor, 2020), represent a very important concept in ecological psychology. Because affordances differ so much between isolated technique practice and competitive performance contexts, they could also lack positive transfer to performance in sports competitions (Button et al., 2020). A major limitation is that they ultimately advocate for standardizing movement execution for all performers or artists. As Bruce Lee stated (Lee, 1975, p. 23), ‘Understanding oneself happens through a process of relationships and not through isolation. To know oneself is to study oneself in action with another person.’

The realities of sport (need for constant problem-solving)

In *Enter the Dragon* (1973), Bruce Lee’s character interacts with a student named Lao. Lee guides Lao through the learning process for a kicking action, each time presenting a slightly variable problem and challenging the pupil with changing aims. Here, Lee is attempting to enable Lao to achieve his intended actions through behavioral (re)organization, to solve problems created by the specific opponent in front of him, captured in the unfolding problem-solution dynamics. As Lee told Lao towards the end of the interaction, ‘Don’t think. Feel! It is like a finger pointing away to the moon; don’t concentrate on the finger or you will miss all that heavenly glory!’ This quote

draws attention to Bruce Lee's unique approach to learning to fight, offering implications for athletes and coaches across all sports. The key point is that actions should be contextualized by the circumstances that emerge. A martial artist, like any athlete, must be perceptually attuned to the surroundings within each moment, intensely engaged with the challenges and problems of the environment (Lee, 2020, p. 84). This idea represents the essence of motor learning in sport – the athlete partaking in a problem-solving activity, whether in the present moment (i.e., motor performance/skill execution) or across longer timescales (i.e., motor learning/skill acquisition). An athlete should remain ready for whatever may emerge, being free to skillfully adapt to openings and challenges within the constantly changing dispositional states of the problem (e.g., opponents in the environment), with the emerging movement action being expressed as a performance solution.

This type of attunement to surrounding information is the basis of ecological psychology (Gibson, 1979): information regulates action, and action creates further information. Attunement could be enhanced in practice interactions where martial artists and other athletes are free to adapt their actions to closely meet the dynamic and complex needs of the peculiar problems and challenges presented by individual opponents. As Bruce Lee (1975, pp. 51-52) frequently proclaimed, one must maintain a constant, observational awareness of an opponent's actions, attempting to read their style and solve the problem in front of them by exploiting the action opportunities available. Thus, practice activities, like water, should be formless, meaning that the problem-solving interactions in sport, as Lee would call the 'what is' (1975, p. 21), are dynamic and ecological: always moving and constantly being shaped by the environment. This key idea of both JKD and ecological dynamics, of engaging with dynamic informational flows in the environment, was captured in the 1978 film *Game of Death*, where Lee's character progressed through various levels

to fight different opponents, each with their own style presenting different problems for Lee to solve. A skilled performer in JKD and ecological dynamics can change the nuances of their movement solution(s) to adapt to the constantly changing constraints of the task and environment, which is consistent with Bernstein's (1967) concept of *repetition without repetition*. Unfortunately, research on combat sports has often neglected and limited the study of interactions between opposing athletes (Krabben et al., 2019). However, it's apparent that this type of co-adaptive relationship and emerging movement behaviors are requisites for successful performance across all sports.

Becoming formless and using 'no way'

> Empty your mind. Be formless, shapeless, like water. When you put water into a cup, it becomes the cup; When you put water into a bottle, it becomes the bottle; When you put water into a teapot, it becomes the teapot. Now water can flow—or it can crash. Be water, my friend (Little, 1996, p. 43).

One of Bruce Lee's most popular messages is captured in the mantra above. But what does it mean? We propose that its relevance to coaches and athletes be interpreted through the lens of an ecological dynamics framework. The subject and title of an ESPN special documentary (Nguyen, 2020), as well as a book written by his daughter (Lee, 2020), the concept begins to speak to the need for adaptability to be placed at the forefront of one's approach in order to more skillfully interact with the world around us, whether within or outside of sport.

As the story of discovery goes, Yip Man was trying to get his pupil, Bruce Lee, to forget about the calculated execution of his movements and instead, follow and respond to the opponent who was in front of him (Lee, 2020, pp. 11-32). However, much like Lao in *Enter the Dragon* (1973), Lee

was intent on trying to assert his will too forcefully. So, Yip Man sent Lee away to think about the meaning of his training methods. During this time away from training, Lee took a small boat out onto the Hong Kong Harbor, where he eventually decided to stop and meditate upon Yip Man's message while his boat went with the waves. After some repeated contemplation, he reached over the boat's side and punched the sea in the harbor. It was then, that the water, in its mutual yet adaptive relationship with Bruce Lee's strike, taught him the valuable lesson captured in the excerpt above. It was here that his fascination with water began. In his aspirational goal to be 'water-like' in everything he did, it became the very essence of gung fu.

Defining adaptability

The Cambridge dictionary defines adaptability as 'an ability or willingness to change in order to suit different conditions.' Practically, this may manifest through an individual remaining present and aware, ready to adjust their movement behaviors to fluctuating external conditions. This narrative flows into the theoretical (re)conceptualization of *skill adaptation*, captured by Araújo and Davids (2011), as the gradual emergence of an adaptive and functional relationship between an organism (e.g., human) and its environment. With this contemporary definition, coaches can view movers in the world (e.g., athletes in their sporting environment), assessing and evaluating each individual's movement capabilities based on how adaptively they can coordinate their behaviors to the dynamically changing *constraints* surrounding them (Seifert et al., 2013).

According to Davids et al. (2008), constraints can be classified by the task (e.g., rules, equipment, boundaries), environment (e.g., light, humidity, temperature, social expectations), and individual (e.g., height, weight, emotional and motivational levels). Newell (1986) originally proposed that the confluence of interacting constraints acts as information that continually shapes or channels

the movement solution that emerges to meet the unique problems faced in negotiating the environment. The landscape of constraints is dynamic: a small change in constraints may lead to large changes in the emerging movement solution and vice versa (Chow et al., 2022). Applied to sports coaching and training through the *constraints-led approach* (CLA) (Davids et al., 2003), coaches can purposefully manipulate constraints to amplify an athlete's search for successful performance solutions, helping them become more adaptable (Yearby et al., 2022). This aligns closely with Lee's JKD, as he realized the importance of adaptive behaviors coordinated with the dynamics of a performance environment so that a functional fit could emerge in a performance context. He stated:

> Set patterns, incapable of adaptability, of pliability, only offer a better cage. Truth is outside of all patterns (Lee, 1975, p. 19).

For example, in handball, if the center forward (or pivot player) is in the midst of an overarm shot when a defender attempts to block it by raising their arms upwards, the act of shooting can be dynamically adapted by accepting the affordance (raised arms of the defender) inviting the player to bounce the shot underneath the outstretched arms of the defender in an attempt to score. The decision to bounce the shot in this example elucidates the essence of using *no way as way*, where the center forward's actions emerge from the deep coupling with the information that specifies available affordances. This example highlights adaptability as an important quality for athletes across all sports and time scales of learning. The CLA could be harnessed to design learning environments where athletes are given more exposure to searching and exploring individually relevant movement solutions (for detailed examples, see Yearby et al., 2022). From an ecological dynamics perspective, research on expertise in sport has shown that key properties of expert movement systems may include adaptive variability, degeneracy, and attunement to affordances

(Seifert et al., 2013), each of which will be unpacked further throughout the numerous examples offered below.

Adopting Bruce Lee's ideas to facilitate skillful movement in sport

The concepts that underpin Bruce Lee's JKD resulted in a paradigm shift within martial arts, revolutionizing approaches within training and competition (i.e., the introduction of *mixed martial arts*).[2] In this section, our discussion extends beyond martial arts, exploring the practicality of these ideas in the context of movement performance and skill adaptation across sports. It also highlights the close alignment between Lee's insights and contemporary ideas supporting an ecological dynamics framework. After elaborating upon these various conceptual principles, which underpin both a JKD practice and an ecological dynamics framework, we will summarize them within Table 1 with the hopes of drawing attention to the potential pedagogical implications stemming from their interconnection.

'Alive' movement problems

Movement problems that are *alive* are those that require a performer to sensitively connect to dynamic information, make decisions in direct and online fashions, and flexibly adjust their actions, coordinating an *integrated movement solution* that is fit to match the peculiar demands of that problem (Yearby et al., 2022). To ensure a functional and behavioral fit emerges, a performer should aim to be attuned to the opportunities (i.e., affordances) present, tightly coupling their movement actions in relation to them. These *more alive* movement problems tend to differ significantly from those utilized in many traditional practice and training environments, where

2 Longtime President of the Ultimate Fighting Championship (UFC), Dana White, even went as far as claiming that 'we needed Bruce Lee, when he came at that time, to help martial arts grow the way that it did; he was the father of mixed martial arts' (Nguyen, 2020).

more passive movement problems are presented. Here, the movement strategies employed and the actions executed are often predetermined, and/or the movements are performed through isolated rehearsal carried out in a rote fashion (Yearby et al., 2022).

Further, in these passive movement practices, where performers are expected to execute the putatively 'correct' predetermined movement technique, coaches often accompany these learning environments with copious amounts of instructions and feedback before, during, and after the movement. Traditional use of instructions and feedback in coaching tends to solve the movement problem for learners. Not only could this pedagogical approach be detrimental to the athlete's exploratory (re)organization of their degrees of freedom (i.e., perceptual, cognitive, and motor) during practice, but it could also strip them of opportunities to problem solve and display authenticity, creativity, and adaptability. Instead, they are encouraged to merely rehearse a coach-prescribed movement solution. Bruce Lee prioritized the importance of honestly expressing oneself. He stated:

> Classical forms dull your creativity, condition and freeze your sense of freedom. You no longer 'be,' but merely 'do' without sensitivity (Lee, 1975, p. 22).

Instead, learning designers could harness ideas of *direct learning* in ecological psychology (Jacobs & Michaels, 2007), helping performers to seek and develop a functional relationship with their environment. This approach to learning is characterized by increasing *attunement* (i.e., heightened sensitivity) to information variables that specify actions. To enhance attunement, a learner's *attention* can be educated by coaches and teachers, assisting them in detecting relevant information sources that could give rise to the emergence of functional movement solutions. To exemplify, in tennis, if a player struggles to detect information to help them return serves, a coach can design

activities to guide their search process. To assist exploration, a coach could also ask: ‘What have you noticed about the location of the ball during the toss in relation to the server's body?’ By asking this question, the coach is encouraging the player to perceive differences in the type of serve being hit (e.g., a flat serve or one with a topspin), which will impact the subsequent ball trajectory. By educating their perceptual search, compared to telling them exactly what to see and how to move, coaches are challenging and enabling players to maintain ownership of their actions through connecting to relevant information and (re)organizing their movement system *degrees of freedom* (DoF) to solve the performance problem. Furthermore, if a player struggles to win rallies because they consistently return shots in similar ways, a coach can educate their *intention* (i.e., how they aim to interact with the world), prompting them to functionally explore (act) and detect relevant informational variables for further action (Button et al., 2020). A coach might guide their intentional exploration by saying: ‘See if you can vary the speed or direction of the return to put your opponent under pressure.’ These ideas can be used collectively to help learners explore how to move with greater adaptability and dexterity when facing performance challenges in sports.

Dexterity, defined as ‘the ability to find a motor solution for any external situation, that is, to adequately solve any emerging movement problem correctly, quickly, rationally, and resourcefully’ (Bernstein, 1996, p. 228), can be pursued by interacting with alive movement problems (Yearby et al., 2022). A performer may not develop dexterity when operating in passive or unopposed situations where the requirement to solve changing movement problems is not a requirement of the learning environment. A crucial consideration for coaches is how the repetitions unfold. Here, we may lean on Bernstein's notion of repetition without repetition (1967, p. 234), which would see performers solving problems of varying complexity in contextual situations under

changing constraints. Once again, this aligns closely with Bruce Lee's approach, as he realized the importance of a more nuanced understanding of practice; for example, he stated:

> Mere repetition of rhythmic, calculated movements robs combat movement of its 'aliveness' and 'isness'—its reality (Lee, 1975, p. 21).

The need for athletes to solve problems through repetition without repetition in the pursuit of dexterity is vital to the emergence of functional movement solutions from an ecological dynamics rationale, just as it is within JKD (see Table 1). For example, this idea emphasizes the importance of athletes performing across changing conditions, such as in disadvantageous weather conditions (e.g., wet fields, windy conditions, and overly bright sunlight). Ask *yourself*: Does your practice harness the reality of the current conditions, where athletes gain valuable experience interacting with the constraints of the environment, or do you forgo the opportunity because of the 'messiness' that may ensue? For instance, in team sports played outside, different affordances will likely be perceived whenever precipitation impacts a player's footing, so the need for solving dynamic movement problems under these conditions could be vital.

The highest technique

Alongside the need for more representative, alive movement problems to be designed within practice sessions, Bruce Lee's philosophies indicated the need for martial artists and athletes to become attuned so they can adapt to the nuances of their opponents' movements. This idea is also fundamental to a coach adopting an ecological approach. As James Gibson alluded to in his work, the most elaborate and richest affordances for humans are provided by other humans (1979). Or, as he stated, 'behavior affords behavior' (1979, pp. 126-127).

As a person moves through the world, they pick up and provide information that specifies affordances, which do not demand behavior; they inform an individual of what is possible, providing invitations to act (Gibson, 1966; Fajen et al., 2008; Withagen et al., 2012). What emerges is still dependent on the performer accepting these invitations. Even though Bruce Lee did not use the same conceptual language, he certainly understood the importance of being adaptable to the dynamic flows of one's environment, especially in responding to the behavior of one's opponent(s). For example, he stated:

> To know oneself is to study oneself in action with another person (Lee, 1975, p. 23).

This comment, along with others offered around Lee's focus on adapting combat techniques and movements to the actions of one's opponent (Lee, 1975, pp. 11-27; Lee, 2020, pp. 81-103), shows Lee's awareness of basing martial arts practice designs on the continuous interactions of a learner with relevant objects, events, surfaces, and significant others in the environment. Movements tightly coupled to an opponent's movement behaviors occur through deepening one's knowledge of (Gibson, 1966) or *in* representative training environments. In combat sports, for example, knowledge of the environment emerges from training sessions where fighters are facilitated to interact with an opponent, becoming sensitive to informational variables such as changing values of interpersonal distances, movement speeds, body orientations, intentions, and more (Krabben et al., 2019). *Bridging the gap* (Lee, 2020) between oneself and one's opponent has tremendous implications across sports. Rapid, sensitive perception focused on 'the area of the thing to be perceived' (Lee, 1975, p. 56) could allow one to establish an individual-dependent, learned *fighting measure* (Lee, 1975, p. 155) where the athlete can focus their attention to perceive openings quickly and accurately. In doing so, contextual experience helps them develop *skilled intentionality*, which is defined as 'the individual's selective openness and responsiveness to a rich

landscape of affordances' (Kiverstein and Rietveld, 2015, p. 701). Attunement and skilled intentionality can develop through experience playing a sport. However, a sound pedagogical approach to complement experience in games would see a coach designing *slices* (Yearby et al., 2022) of the sport in practice where the complexity is scaled (see Table 1). This approach provides athletes a chance to detect and become sensitive to information and the specified affordances, finding functional solutions to the performance problems they encounter. It enables combatants and performers in other sports to harness *brinkmanship*, defined as being aware of and operating within one's action boundaries, where performers purposely act in metastable regions[3] on the brink of their capabilities (Krabben et al., 2019; Kimmel & Rogler, 2018). For example, when retreating from an opponent's advances in fencing, system metastability arises when two or more behavioral opportunities emerge from the interactions (e.g., a parry or thrust toward the opponent yielding a touch). In field sports such as American football or rugby union, as ball-carrying offensive players gain exposure to informational variables such as the interpersonal distance between an opponent and themselves (Passos et al., 2008), they may become perceptually attuned to certain values of this range, which constitute a metastable region. Metastability offers an opportunity to execute a variety of potential evasive cutting actions (e.g., an outside foot 'power cut' or an inside foot 'crossover cut') with an equal likelihood of success. To take advantage of metastability during competitive performance, athletes need to experience these regions in practice landscapes in hopes of becoming more sensitive to what is afforded to them. In these illustrations, we see Lee's ideas of adaptable actions underpinned by the tight circular causality occurring between the intertwined nature of the processes of perception, cognition, and action.

3 Metastable or Metastability: System component parts both coupling together while still tending to express independent behavior with the capacity of switching between two or more movement strategies/actions/patterns (Kelso, 2012).

Harnessing abundance (of strategies and solutions)

Adaptability, flow, and a water-like nature of movement are crucial for performers to find functionally fit solutions to the problems they face in sports. The notion of *degeneracy*, or 'the ability of elements that are structurally different to perform the same function or yield the same output' (Edelman and Gally, 2001, p. 13763), is pertinent to the discussion of athletes conceptualized as complex adaptive systems. Here, the system (re)organizes the available DoF, described as the component parts of a movement system (Bernstein, 1967), such as the muscles, joints, and bones, to accomplish the same task goals. Embracing repetition without repetition in practice, where athletes explore different ways to organize their DoF (i.e., perceptual, cognitive, and motor) to solve similar performance problems, helps exploit movement system degeneracy. Theoretically, as an athlete's abundance of usable DoF (within their movement system) grows, so may their adaptability (of their movement solutions). It is the enhancement of degeneracy that may precede an athlete's expression of dexterity.

Consider a football quarterback who can vary the arm slot and path of their passes to throw the ball around or over defenders who stand between them and the open receiver and still complete the pass in an accurate and timely manner. Or think of a soccer player who can vary the speed, trajectory, and spin on the ball as they execute a shot on goal depending upon where the goalkeeper is positioned and how opponents are behaving. Additionally, think of a player in badminton who picks up the opponent's position near the back of the court and orients their body to hit a forehand drop, drawing the opponent closer to the net, or a forehand clear, moving the opponent away from the net. Finally, think of a rugby player who can functionally utilize various cutting strategies to evade a tackle attempt by a defender, effectively leaving the tackler frozen because they expected the offensive player to move somewhere else. Athletes could learn how to carry out these types of

emergent movement solutions, illustrated in each of these examples, by being given ample opportunity within the practice environment to sufficiently explore the breadth and depth of their movement toolbox and the various options within it (see Table 1). Abundance and formlessness are ideas threaded throughout Bruce Lee's teachings, and they were woven into how he interacted with the world, as he felt as though having the ability to coordinate a diversity of behavioral actions could better facilitate functional adaptability within martial art combat. As he said:

> A fighter cannot use the same actions against every opponent. A good man should vary his game with simple and complex attacks and counterattacks with changes of distance, etc. (Lee, 1975, p. 199).

Honestly expressing oneself

On the *Pierre Berton Show* (December 9, 1971), Bruce Lee delivered a convicted statement when he said:

> Honestly expressing yourself...it is very difficult to do. I mean it is easy for me to put on a show and be cocky and be flooded with a cocky feeling and then feel like pretty cool...or I can make all kind of phony things, you see what I mean, blinded by it or I can show you some really fancy movement. But to express oneself honestly, not lying to oneself...now that, my friend, is very hard to do.

Within the execution of various sport movement skills, many coaches, just like many martial arts teachers, believe that there is a putatively idealized model for carrying out actions and movement patterns that all performers should follow. However, Bruce Lee believed that every individual should find actions that efficiently and effectively solve the performance problem at hand, which

may be quite unique to the individual performer. Therefore, he felt as though, by using *no way as way*, an artist or athlete could expand their skill execution well beyond what is typically taught as the 'ideal' movement template. Instead, an athlete could choose to explore their own authenticity in any skill or movement pattern to maintain a sense of freedom that allows one to adapt movement to the changing contextual constraints present. As he asked (Lee, 1975, p. 19), 'Is he a living, expressive human being or merely a patternized mechanical robot? Is he an entity, capable of flowing with external circumstances, or is he resisting with his set of chosen patterns?' These ideas are fully aligned with ecological dynamics, which propose that exploration in practice could enhance the variability present in the coordination and control of movement solutions, materializing in adaptive, creative actions (Orth et al., 2017). Finding original, yet functional movement solutions that are authentic to oneself is an impetus to achieving the highest levels of movement skill for a performer (Seifert et al., 2013).

Within the organization of most movement skills, there is a wide range of variability and bandwidth of execution that a performer could adhere to, which could still be deemed functional (Orth et al., 2017). Thus, too tightly adhering to idealized models of skill execution or a technical model for a movement skill could potentially rob athletes of their authenticity by overly fixing and freezing DoF across the dimensional levels of the human movement system (i.e., perceptual, cognitive, and motor). This may lead to the athlete being hyper-constrained when dealing with perturbations present from key performance inhibitors within any competitive sport environment (Glazier, 2017). Movement variability, creativity, and authenticity could be considered important aspects of adaptive, skilled movement behavior (Orth et al., 2017; Button et al., 2021), helping the performer to satisfy dynamically changing constraints.

For example, wrestlers are generally instructed to stand in a staggered stance, low to the ground, with their elbows tight to their bodies. While this position might be advantageous for some, it could hinder the authentic movement of others proficient in takedown defense from different stances. One's true expression might see them interchangeably moving from a taller position to a much lower one, inviting their opponent to shoot for an attempted takedown. Similarly, think of an American football player, such as an offensive wide receiver or a defensive end, in their stance at the start of a play. Traditionally, most players at those respective positions may utilize a certain leg forward, a given weight distribution in the stance, or a specific acceleration strategy. However, the adoption of an alternative strategy, such as having the opposite leg forward in the starting position or possibly the employment of a false step (e.g., plyo step or jab step), could be a viable option for the player if they feel comfortable executing in such a fashion. If coaches require an athlete to ‘drill’ an ‘ideal’ technique, they may not only limit the athlete's honest expression of themselves, but they may also greatly reduce the likelihood of the athlete organizing a creative and adaptable movement solution under changing constraints. In training and practice, both from an ecological dynamics perspective and within JKD, it is important that athletes are given ample opportunity to purposefully explore different strategies for solving problems in their own authentic ways and deepen their knowledge of the competitive environment (see Table 1).

Adapting through uncertainty and discomfort

Bruce Lee believed that when an individual is tested with periods of discomfort, challenge, chaos, or threat within a training or practice environment, it can present an opportunity to facilitate the development of skill adaptability (Davids et al., 2008). Under these challenging circumstances, a martial artist or athlete may be required to stretch, grow, and evolve, resulting in a better-equipped movement system for the rigors of the most competitive demands. This necessity to *bend and*

survive as a means of facing challenges and successfully overcoming adversity was conveyed throughout Lee's approaches to both the martial arts and life, such as when he frequently would speak of the willow tree being able to bend with the wind and adapt to elements of the environment as a means to survive (Little, 1996, pp. 51-60). With supportive theoretical reasoning and empirical evidence, this idea of conveying adaptable flow could be important for movement and skill acquisition practitioners to emphasize during their practice. Though it was grounded within a more traditional information processing approach, the *challenge point hypothesis* (Guadagnoli et al., 2004) proposes that different tasks will present various levels of challenge to different performers based on the amount of information presented within a practice task, where optimal learning might emerge through finding a balance between success and difficulty in practice. Viewed from an ecological perspective, this idea could be captured as a performer being required to stretch their *optimal grip* over a field of affordances (available in a particular performance environment), signified by them exploring potential movement solutions that are available when interacting with challenging situations (Bruineberg et al., 2014). Having desirable difficulties within the problems presented in practice could stretch athletes to seek adaptation through the need to deal with uncertainty and discomfort (see Table 1).

Some practical ways in which a practitioner may be able to channel more water-like adaptability within the performance of athletes, especially under the inhibiting, uncomfortable constraints of heightened complexity, pressure, anxiety, and fatigue, could include (a) requiring athletes to train or practice in *less optimal* environmental conditions such as wind, rain, snow, cold, or heat; (b) allowing the athlete adequate room to make more mistakes in practice; and (c) presenting highly difficult problems to athletes, such as facing more skillful opponents in highly dynamic scenarios that contain an abundance of information to detect to adequately coordinate movement solutions.

Each of these practical recommendations could offer athletes the opportunity to search, discover, and exploit affordances present within the performance landscape while learning how to coordinate the various nuances of their movement solutions (i.e., perception, cognition, and action) to meet the demands of highly complex movement problems. Through uncomfortable challenges, athletes could be required to experiment with taking calculated risks or encountering currently unsolvable problems, where they must constantly find ways of adapting. Here, athletes may become more resilient and adaptable in the face of uncertainty and discomfort in the competitive sports environment.

Surprising one's opponent through deception

Bruce Lee was notorious for perceiving and acting upon every opportunity he could in gaining an upper hand over his adversary. Part of this advantage could come in the form of deception, where an individual could look to create or seize circumstances in which the element of surprise may work to their benefit, as an opponent may not know what to expect or how to respond. Lee (1975, p. 64) claimed that 'We must *surprise* our opponent and catch the moment of his *helplessness*.' Furthermore, he argued that: 'Strategies of distracting attention (fakes and feints) are athletic devices to direct the opponent's attention and to make him hesitate before he can be sure of his cue to act' (Lee, 1975, p. 56). Though it is an understudied area of research, investigations in deception and disguise, emerging in context, show that more skilled athletes attempt to disrupt an opponent's ability to successfully adapt their actions in relation to unfolding interactions (Ramsey et al., 2022). Within an ecological dynamics framework, these types of deceptive behaviors could be understood as *misleading affordances* (in accordance with Ramsey et al., 2022), where one's opponent is invited to act on an opportunity through the intentional manipulation of the information present to couple one's movement behaviors to.

Anecdotally, purposeful deceptive actions are very apparent within martial arts. Many mixed martial arts fighters, in particular, have recently taken Bruce Lee's principles on deception and incorporated strategies such as various feints and fakes within their striking skill in an effort to (a) draw out certain attacks or defensive strategies from the opponent; (b) confuse the opponent, thereby freezing their system DoF; and (c) set up alternative and/or future offensive attack strategies for themselves (i.e., *successive affordances*). Athletes within other sports could potentially draw upon this experiential evidence and find ways to apply deceptive strategies within the coordination of their own movement solutions (see Table 1). For example, field sport athletes, when presented with evasive agility scenarios versus opponents in the open field, may be able to utilize jukes and head fakes or changes in running paths and speeds, leading to indecision and missed tackle attempts from opponents. Similarly, a basketball player may be able to break the stability of the system between a defender and themselves by faking that they are going to pass to a teammate or potentially dribble around the defender when instead they are acting in a way to open up an opportunity for a more advantageous shot.

[TABLE 1 NEAR HERE]

Discarding what is not

As an authorship team, we believe we would be amiss if we didn't point out some additional concepts and anecdotes related to Bruce Lee that we feel lack empirical evidence or theoretical alignment with an ecological dynamics rationale. Of course, it may be unrealistic to expect Bruce Lee to gravitate entirely toward the adoption of a singular theoretical perspective to pedagogy, especially when he was already challenging so many well-established traditions in martial arts training at that time. The aim for any practitioner is to be in a constant state of refinement,

growth, and evolution within one's craft. Thus, in true Bruce Lee fashion, we would like to *discard what is not* aligned with an ecological dynamics approach from the work of Lee.

For starters, one of Bruce Lee's most famous quotes is undoubtedly, '*I fear not the man who has practiced ten thousand kicks once. But I fear the man who has practiced one kick ten thousand times*' (Lee, 2020, p. 104). This comment seemingly takes a stand for the development of technical proficiency, developed through deliberate practice and repetition (maybe even by rote), contradicting many of the ideas shared earlier in the article related to movement variability (and repetition without repetition), abundance, and adaptability.

Thus, if we were to *absorb what is useful* and *add what is uniquely our own* to Lee's words here, we may modify the quote to say:

> *I fear not the man who has practiced ten thousand kicks once, nor the man who has practiced one kick ten thousand times; but instead, I fear the man who has practiced against ten thousand opponents or practiced solving ten thousand different movement problems.*

Here, we acknowledge our obvious liberty in proposing these modifications. However, we believe that this modified quote would more closely align with Bruce Lee's earlier thoughts on JKD (i.e., using no way as way, the honest and authentic expression of skill, the adjustment of technique execution to the behaviors of one's opponent, the aliveness of one's attacks), as well as those oriented in relation to ecological dynamics.

Next, it is known that Bruce Lee did (see the work of Little, 1998), at least occasionally, use training modalities like heavy bags, dummies, or pads while also participating in shadow boxing—

all methods that, on the surface, contradict his advocacy for the need for aliveness within the training environment. Though some practitioners may choose to include rote repetition within *less alive* decontextualized activities (i.e., drills), particularly with lesser-skilled athletes, in hopes of assisting them in the *acquisition* of *fundamental* movement patterns, we feel it's clear that adaptive and functional movement skills are better expressed while one is immersed in solving alive movement problems in real-time. In contextualized practices, unexpectedness and surprises run rampant, and the artist/athlete is required to flexibly adjust and coordinate their actions in relation to the opportunities presented there (i.e., *to become one with the peculiar problems of one's world*). Thus, we could hypothesize that these less alive activities could be utilized, potentially as supplementary work only, to increase the efficiency and/or output of practiced motor actions (e.g., a kick or punch), thereby addressing one's action capabilities or effectivities. However, as noted earlier, over-reliance on passive practice designs could give the martial artist or athlete a false sense of functionality in performance since these tasks lack representative design based on a lack of problem-solving opportunities and fidelity of movement solutions.

Conclusion

Bruce Lee was a legendary icon who will live on through his revolutionary work in martial arts, philosophy, and motion pictures. Here we explored the alignment of many of his innovative ideas within his methods for martial arts, in the form of Jeet Kune Do, with contemporary theoretical ideas in movement skill acquisition from an ecological dynamics framework. The available evidence suggests that Bruce Lee's approach to performance and coaching was truly ahead of its time. Coaching practitioners attempting to facilitate movement enrichment and the acquisition of sport skills could be well-served to explore Bruce Lee's ideas in relation to fundamental concepts in ecological dynamics.

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