Toward Ithaka: hiking along paths of knowing of/in an ecologically dynamic world

Toward Ithaka: Hiking along paths of knowing *of/in* an ecologically dynamic world

Carl T. Woods[1*]

[1]Institute for Health and Sport, Victoria University, Melbourne, Australia

*Corresponding Author

Carl Woods, Institute for Health and Sport, Victoria University, Melbourne Australia

Email: carl.woods@vu.edu.au

Abstract

Anthropologist Tim Ingold recounts that humans inhabit a familiar, yet evolving world – stretched between 'the happened' and 'the not yet'. Despite efforts to the contrary, we can never fully be sure of its future configurations, making it difficult to determine how to solve yet-to-be-encountered problems, or how to skilfully navigate through uncharted terrain. Following on, I contend that to thrive in such a world is not to coordinate our orientation *onto* its surface in advance, but is to move, immersed *with* its opportunities for action; *knowing as we go.* Specifically, weaving together works from ecological psychologist James Gibson, and educational philosopher Jan Masschelein, with those of Ingold, I review the idea that knowledge growth of everyday tasks requires *correspondence with threads of inquiry*. This proposition highlights three principles of skilled behaviour, knowledge, and education in an ecologically dynamic world: mastery as submission to constraint; knowing about as subsequent to knowing of; guidance without specification. I bring life to these principles through various applications in sporting contexts.

Key words: Anthropology; Ecological dynamics; Complexity; Education; Knowledge; Transdisciplinarity

"As you set out for Ithaka, hope your road is a long one, full of adventure, full of discovery. May there be many summer mornings when, with what pleasure, what joy, you enter harbors you are seeing for the first time" – Constantine P. Cavafy

Prologue: On a hike

Like others, I enjoy hiking through various landscapes. Indeed, while the prospect of hiking a new trail is exciting, I have favourites that I revisit when the opportunity presents. These are trails that leave me with an unceasing itch to return, filled with a deep sense of familiarity. Though, I am not the same upon return; having grown, developed and changed – I am of course, continually *becoming*. Further, the indeterminacy of our ecological world, manifest (for example) through prevailing weather conditions, fluctuating seasons, the habitation tendencies of other species, and an ever-encroaching urbanisation and sprawl of human activity, means that what I encounter while on these trails is never quite the same. A sentiment profoundly captured by Alfred North Whitehead (1919, p. 14): "there is no holding nature still and looking at it".

I am, then, never really sure of what I will encounter when setting out to hike these trails. That is, in a way, I am both prepared and unprepared, pushing out into a world in-becoming: *knowing as I go*. This realisation invites an selective responsiveness to the various things encountered – like actively listening to the sounds of distant birds and other inhabitants going about their business, feeling the undulating creases of the trails surface in its meandering, smelling the in-coming rain and inclement weather – rigorously corresponding with such threads as I find my way along the trail in its becoming. So, when asked by a companion joining me on one of these familiar hikes, "what will we see?", I am inclined to respond with, "I'm not too sure today, *so let's head out and have a look!*"

Introduction

Inspired by the eminent work of anthropologist Tim Ingold, this paper explores what it could mean to grow our knowledge of the various tasks we undertake in an ecologically dynamic world. It starts from Ingold's philosophical ontogeny of *correspondences*, exploring what this could mean for skilled human behaviour, particularly in the phenomena of sport. Then, it weaves in ecological descriptions of knowledge, leading to the proposition that in most aspects of life, we need to correspond with threads of inquiry to grow our knowledge *of* the various tasks we take up with *in* the places we do. A thread is defined here phenomenally, as something that calls for our attention in a specific place and context; an invitation that we are compelled to respond to. This means that knowledge is understood as an entanglement of threads, forming an in-complete, ever-becoming, and unbound *meshwork*[1].

As contended, the detection of such threads requires a twofold commitment; to be present in the present, but selectively open to what could be next. To support this, I weave in Jan Masschelein's (2010) descriptions of education, encouraging experienced individuals to lead inexperienced companions out into the world, softly guiding their attention toward various threads that can be followed to support ongoing skilled behaviour. Thus, there are two sides to attention reviewed here – one, an attuned perceptual mastery (Gibson, 1979); the other, a circumspect patience and forbearance (Ingold, 2013; Masschelein, 2010), waiting on the world to open up possibilities to carry on.

In weaving together these ideas, three related principles of skilled behaviour, knowledge, and education are brought forward: (i) mastery as submission to constraint; (ii) knowing *about* as subsequent to knowing *of*; (iii) guidance without specification. While bringing life to these principles through various examples, I primarily contextualise them in the sport sciences. More than just their application, though, this paper should be seen to encourage others in their journey

[1] I borrow this phrasing from Ingold (2007).

toward Ithaka[2] – embracing the path in its unfolding by corresponding with threads of inquiry as they go.

To correspond

There is a particular excerpt on page 11 of Tim Ingold's (2020) most recent book, *Correspondences*, which caught my attention:

> "To correspond is to be ever-present at the cusp where thinking is on the point of settling into shapes of thought. It is to catch ideas on the fly, in the ferment of their incipience, lest they be washed away with the current and forever lost."

In many ways, this paper reflects the very sentiment of this evocative quote. For example, while sitting here scribbling notes in my book, I am somewhat sure of where this inquiry will lead me, but the path is not totally fixed. That is, I have a niggling idea that is progressively taking shape as I *correspond* with its various threads in their unfolding. By 'correspond', I mean an active engagement, manifest in the weaving together of my ideas *with* those of others, not to reach a conclusion, but to *carry on* in a unique direction (see Ingold, 2010). Perhaps by carrying on in such a direction, others will seek to correspond with the threads opened here, leading us further along a path of knowing as they weave their insights into the entangling *meshwork of inquiries*. The sentences preceding the above quote are important to incorporate, as they capture three integral aspects of what it means 'to correspond', each forming a thread woven throughout this paper:

> "First, every correspondence is a *process*: it carries on. Secondly, correspondence is *open-ended*: it aims for no fixed destination or final conclusion, for everything that might be said or done invites a follow-on. Thirdly, correspondences are *dialogical*. They are not solitary but go

[2] Inspired by Homer's Odyssey, Constantine P. Cavafy's (1911) poem, *Ithaka*, elaborates on a metaphorical journey one takes toward a destination never reached. While on the journey, one encounters and explores many different places, growing their knowledge of these places and its inhabitants as they go. In this sense, knowledge is not an end point to be reached, but is a journey that continually unfolds *along a path toward Ithaka.*

> on between and among participants. It is from these dialogical engagements that *knowledge continually arises*." (Ingold, 2020, p. 11, my emphasis and in original)

Submitting masterfully

According to this epigraph, correspondence, it seems, is about being aware of where one has been, attuned to opportunities of the present, and selectively open to the possibilities of what might be next (Ingold, 2020). This is a sentiment rooted in a complex, ecologically dynamic view of the open world we inhabit, where surprises, twists and turns are unavoidable, and where absolute certainty is impossible (Juarrero, 1999; Morin, 2008). This is not to deny that humans – as complex adaptive systems – are intentional organisms striving toward maintaining an *optimal grip* on a 'rich landscape of affordances' surrounding them at all times (Bruineberg & Rietveld, 2014; Rietveld & Kiverstein, 2014; van Dijk & Rietveld, 2017). Intentions play an important role in functionally skilled behaviour by narrowing the scope of alternatives within a multidimensional space of possibilities (Araújo et al., 2019, 2020; Reed, 1996a; Rietveld & Kiverstein, 2014). They should not be viewed, though, as intrinsic to an organism, but as emergent in the organism-environment system that support *on going* skilled behaviour. In other words, they "are not causes of action, but patterns of organisation of action; they are not mental as opposed to physical, but are instead embodied in the kinds of performances most likely found in cognitively capable creatures" (Reed, 1993, p. 62). Intentions, thus, can be understood as patterns of organisation that emerge in situations consisting of multiple behavioural choices.

In discussing the emergence of intentional behaviour, Alicia Juarrero (1999) asserts that context is everything. This highlights that the stability and coordination of human behaviour is channelled and self-organised under various interacting constraints, functioning at different timescales within the places and sociocultural contexts one is situated (Araújo et al., 2020; Davids et al., 2008; van Dijk & Rietveld, 2017). This is important for sports scientists to consider, as it implies that any interpretation of skilled behaviour should be a *tentative* one

(Juarrero, 1999). I can intend, for example, to leave my office to get my lunch from the staff room located down the corridor. But the timing of this action, from day-to-day, may vary depending on a multiplicity of things, like my appetite, schedule, demands on my time, which colleagues are chatting in the corridor, and by various other unexpected events that may emerge. By acting on the intention to take lunch, however, the probability of me picking up a book to begin reading or to change into my gym clothes to undertake some exercise falls downstream. That is, my scope of behavioural possibilities narrows from a wider range of alternatives toward certain organisational states that solicit 'getting-my-lunch'. But en-route to the staff room, I may unexpectedly encounter a colleague who stops me for a chat; I may turn the corner and encounter a spillage on the floor blocking my way; or, upon entering the staff room, I may encounter a colleague already using the microwave, which I intended to use. These emergent context-sensitive constraints, acting as information exemplified in sociomaterial properties of the environment, are not determining but *perturbing* my coordinated behaviour by restructuring the landscape of available affordances[3] (Bruineberg & Rietveld, 2019). This restructuring is taking place through the solicitation of certain affordances – affordances that *stand out* – as I strive toward maintaining an optimal grip on the situation in its unfolding (Bruineberg & Reitveld, 2014).

To preserve the functionality of intentional behaviour in a world undergoing *continuous generation* (Ingold, 2010, p. S125), people are compelled to respond to certain threads of inquiry that open up. For example, I maintain social coordination with my colleague by engaging briefly in conversation with them; I avoid the spillage on the floor by adjusting my path to the staff room; I wait patiently while my colleague uses the microwave. That is, I make my way to my lunch by continuously adapting my actions[4], carefully perceiving various

[3] Defined here phenomenally, as invitations to act (cf. Withagen et al., 2012).
[4] Dynamically, this is captured by the concept of degeneracy, which describes how the same output (i.e., getting my lunch) can be achieved by structurally different system configurations (Edelman & Gally, 2001).

144 invitations to act within the restructuring landscape of affordances, shaped by intentions,
145 experiences, and other emergent constraints of events which may be unfolding on the horizon.
146 Moreover, by attuning to the situation in its unfolding, I am actively regulating my behaviour.
147 I do not, for example, abruptly take my colleague's lunch from the microwave to put mine in
148 given the context-sensitive constraints acting upon both of us, amplified at this point within
149 our workplace. Rather, by following social conventions and expectations that I have grown
150 sensitive to – thereby waiting for them to finish – I play my part in maintaining a temporarily
151 coordinated 'social synergy' (Marsh, 2015). In the same vein, they play their part in the
152 (unspoken) social engagement by adjusting their behaviour in response to my waiting. We are,
153 in a word, *corresponding* (cf. Ingold, 2013, 2015, 2020).

154 This description of mundane, everyday occurrences in life illustrates the significance of
155 behavioural flexibility and adaptability during correspondence with the environment,
156 composed of other people, things, substances, surfaces, events, systems and processes. These
157 adaptive behaviours, shaped under constraint, are predicated on continuous use of perception,
158 action and cognition allowing us to switch between various opportunities to act as the
159 affordance landscape restructures (Bruineberg & Rietveld, 2019). This behavioural flexibility
160 is captured by the dynamical concept of *metastability* (Hristovski et al., 2009; Kelso, 1995;
161 2012; Pinder et al., 2012). In a metastable region, system behaviour is balanced to transition
162 between multiple attractors of competing tendencies – for components to couple, coordinating
163 together, forming new synergised dynamics (captured by my colleague and I maintaining social
164 synergy in our correspondence), or for components to continue on acting independently
165 (Davids et al., 2012; Kelso, 2012). Metastability, then, could offer an interesting dynamical
166 concept to be explored through Ingold's philosophical ontogeny of correspondences.
167 Specifically, the responsive switching between multiple attractors captured by this concept
168 resonates with the three distinguishing properties of correspondences cited previously.

Constraints do not just limit possibilities to act, but they concurrently *open others up* – that is, they can be enabling (Juarrero, 1999). While the conversation with my colleague in the corridor, for example, may limit my temporal capability to eat my lunch, its dialogicality, when coupled with a selective responsiveness, may open up ideas and discussions about a new project, leading to new opportunities for correspondence. By going along – submitting to the constraints of the environment and task – I am not just closing off some possibilities, but through perceptually attuned, selective and adaptive behaviour, I may actively open up invitations that I can (or not) take up. Stated differently, while submitting exposes me to the risks of a world becoming, my skilled perceptual attunement opens threads of inquiry that I can (or not) follow up with. Though, simply going along with threads in their opening does not mean that behaviour and knowledge growth will be advantageous. So, while carrying on, consideration must be given toward "how things are going" (Dreyfus, 2007, p. 259). The conversation with my colleague, for example, may indeed lead to new, advantageous opportunities for knowledge growth, but it may also lead to disadvantageous things I do not want to take up, leading me to search for an opportunity to leave the discussion and carry on to my lunch.

At a broader scale, this perspective of intentionality shaped under constraint[5], proposed here as a balance between submission and mastery, is seen in many aspects of our lives. Exemplified by an opening batter facing the first ball of a cricket match, unsure as to what ball will be bowled, but trusting that their masterfully attuned perceptual systems will help them defend or score; an experienced angler casting off into a stream, unsure as to whether they will catch their prey, but trusting that their masterfully attuned judgement of location, bait and hook will help them catch a fish; or, an award-winning chef blending seemingly disparate ingredients, unsure

[5] For further insight, see Juarrero (1999), where agency and intentionality are re-considered beyond static cause-effect relations, viewed instead as emergent from surrounding constraints.

as to the precise flavours that will emerge, but trusting that their masterfully attuned palate will lead to a unique taste and dish. Indeed, like me in writing this paper, although the cricketer, angler and chef may have an inclination, a niggle as to what may be ahead – a situated anticipation sensitive to the unfolding invitations to carry on[6] – they are all bound by the same principle: in a complex, ecologically dynamic world, *submission to constraint leads, and masterful attunement adaptatively follows* (Ingold, 2015, ch. 27). This principle of skilled behaviour emphasises the value of trust in experience, learning, expertise, and in understanding what one brings to a complex performance environment. This is shown by the individuals in each example who are setting off into a world in-becoming, carefully searching for opportunities to adaptively follow on – seeing the swing and pitch of the ball to play the 'right' shot, feeling the nibble of a fish to reel in the line, tasting the blended ingredients to add more, less or different – as they *intend* to win a cricket game, catch a fish, cook a meal, or as it may, write this paper!

Different sides of the same coin

If we are to accept this first principle, then to correspond with emergent threads of inquiry would not be about controlling them, but rather, *attending* to them. My interpretation of attend is influenced by ecological psychology, where it is understood as an attunement to (or resonation with) key regulatory sources of information that specify opportunities to act in one's environment (Gibson, 1966, 1979). This process is oft-understood as a progressive 'education of attention' (Gibson, 1979). From this perspective, a skilled individual is one whose perceptual systems are finely tuned, allowing them to carefully *stretch toward* the most of subtle sources

[6] In line with van Dijk and Rietveld (2018), skilled individuals can anticipate future events by way of an active participation *with*. The skilled angler, for example, has a 'niggle' (or is 'instinctive') about catching a fish in 'this' location using 'this' equipment, because they participate with the activity of fishing. Progressively, this leads to a sensitivity toward the invitations that keep open 'catching fish'. Thus, what is learned is not just the act of fishing, but a capability to read the unfolding situation (i.e., they are becoming *enskiled to the taskscape* – see Woods et al., 2021).

of information that specify an environments affordances (Ingold, 2018). This is exemplified in sport by a skilled tennis player, mid-rally, stretching toward the subtle sounds and visuals of an opponent's ball-racquet contact to adapt their court positioning and return a winner, or a yacht skipper, mid-race, stretching toward the feeling of wind gusts when tacking in 'that' direction.

Though, in a dynamic and open-ended world undergoing continued (re)generation, invitations to act would not just be ready-made, simply waiting for an attentive perceiver. But they would continually come into being, along with the perceiver (Ingold, 2018). Attending, then, is not just about skilfully stretching toward 'what' is there, but is also about *waiting on* invitations to carry on (Ingold, 2018). This is why educational philosopher Jan Masschelein (2010) interprets attend as *attendre* (French), roughly meaning 'to wait'. Thus, to stretch toward (masterful attunement) and to wait on (propitious forbearance) are different sides of the same coin; *attention* (Ingold, 2018). This proposition is exactly why in the prologue I emphasised being both prepared (i.e., stretching toward) and unprepared (i.e., waiting on) when hiking my favourite trails. Prepared, in that I have a broad intention that invites certain opportunities to act; a sort of 'getting ready to hike' that requires an overview of the task (i.e., which boots to wear, what supplies I should take, how long I could expect to be hiking 'this' trail for, and so on). Note, while this 'getting ready' does require anticipation, it is forethought which is deeply situated, set in the practical context of the activity rather than being merely isolated to my mind (cf Ingold, 2011, p. 54). Moreover, the assortment of things while 'getting ready' are not what determines the hike, but are what guides its *determining*. Given this, once I head out to actually hike the trail, there is an inevitable unpreparedness, an appreciation that both the trail and I are continually becoming. Stated differently, I have grown to understand with experience that – despite my preparedness – I may need to carefully and skilfully respond to sudden events that open up as the hike unfolds (both advantageous and disadvantageous). This is because the trail

238 is not set on a static landscape to be 'looked at' while I hike *across* it, but is part of a dynamic
239 land*scape* 'being shaped' while I hike *through* it[7].

240 The above appreciation of my skilled responsivity when hiking is important for this paper, as
241 it underwrites a *presence in the present* (Masschelein, 2010; Masschelein & Simons, 2013). To
242 me, this key idea manifests in the differences between actively feeling one's way through a
243 task in its unfolding, like an improvising musician 'in the groove', cor*responding* with/to
244 varying sounds and tempos as they rhythmically make their way through an emergent harmony
245 (Love, 2017), and passively following a prescribed 'way of doing', exemplified in directions,
246 rules, scripts, and regulations. In sport, these differences are exemplified in comparisons
247 between a coach with a *destination-orientation*, designing elaborate game models and pre-
248 planned set procedures, orchestrating training in such a way to perfect their rehearsal and
249 enactment by players, and a coach with a *journey-orientation*, encouraging players to search,
250 discover, create and participate with various opportunities that (may or may not) unfold during
251 game-play, observing what emerges by appreciating that no two problems, events, or players
252 are the same. The former coach advocates point-indexicality, artificially directing a player's
253 attention toward conventional end-points or fixed-destinations – repetitively rehearsed 'plays'
254 – that may come at the expense of supporting athletes learn to correspond with emergent
255 threads of their performance landscape. The latter coach, by contrast, encourages in the players
256 a sensitive attunement and (cor)responsiveness to the games threads as they emerge;
257 appreciating that the outcome of the practice task is subsequent to the attentiveness grown in
258 its unfolding. In other words, *one does not have to know all the steps when the destination is*
259 *subsequent to the journey*.

[7] A conventional interpretation of 'scape' is one of 'scopic', implying land-looked-at. However, Olwig (1996) reminds us of its Germanic etymology of *shaft*, meaning land-being-shaped. This emphasises the landscapes *temporality*, which Ingold (2000) emphasises as the 'on-going-ness' of time entangled with the resonate and interlocking tasks of inhabitants. It is through these ongoing tasks where the land*scape* is continually shaped.

These ideas have opened an inquiry that I would now like follow on with. That is, if to correspond, we are to acknowledge that submission to constraint leads and perceptual mastery adaptively follows, are we not then facing an uncomfortable realisation that to know, is to profess that we do not? Stated differently, in a world becoming (of which we are apart), are we not compelled to appreciate that the only certainty is uncertainty? A resolution to this could reside within how we conceptualise what it means 'to know' in a world undergoing continued (re)generation. Leaning on key ideas of ecological psychology (Gibson, 1966, 1979), the next section explores what it means to know *of* and *about* the tasks we take up with in the places we inhabit. By doing so, I aim to bring forward an epistemological layer to Ingold's philosophy of correspondences, proposing that corresponding is transformational not documentational; it is knowing *as we go*, not *before we leave*.

To know

I would like to start this section like the previous, with an excerpt from Ingold's (2020) book, *Correspondences*:

> "Nature is not silent. It may have nothing to say, and were our ears open only to facts and propositions *about* the world, as the protocols of science require, then indeed we would hear nothing. We would be deaf to the gale in the trees, the roar of the waterfall and the song of the birds. For these are propositions that stand only for themselves. They are *of* the world, and it behoves us to *attend* to them." (p. 122, my emphasis and in original)

The profundity of this epigraph is in its hints at what it means to know. Indeed, many of us live in a society that often conflates knowledge as something to be mediated, pre-packaged, categorised, and even commercialised (Reed, 1996b). Seen as an entity ready to be transmitted into the minds of those deemed less knowledgeable when the time is right. 'Knowing', in this contemporary epistemology, is considered to be almost encyclopaedic – to internally memorise, store, and document second-hand information (facts and data) told to us, which can

be rolled off anywhere, at any time. Though, as captured above by Ingold and as eloquently discussed by Reed (1996b), that would be to know *about*, not necessarily to know *of*, a crucial difference, pioneered by ecological psychologist James Gibson (1966, 1979), that I now explore.

Knowing of; knowing about

In his theory of direct perception, Gibson (1966, 1979) argued that there was no need for an animal to mediate interactions with its environment through the construction of representations, stored in the brain. This is because ecological information, omnipresent within an animal's environment, directly specifies its affordances (Gibson, 1979). Indeed, this is not to deny the role of the brain in direct perception – despite oft-fallaciously argued as being so – but that its role is not computational or to act as a storage device. Rather, the central nervous system's role is one of keeping an animal in contact with the affordances of its environment through the resonation with information picked up from surrounding sources, providing it with knowledge of its habitat (Bruineberg & Rietveld, 2019; Gibson, 1979; Reed, 1996a; Teques et al., 2017). This demands rigorous concentration from the skilled performer, a concentration which is not confined to their mind, but one that continually leaks out through an embodied participation with the affordances of the environment (Clark, 1997). Affordances are neither objective or subjective, but both – coupling objects of the world to an animal's behaviour (Gibson, 1979). They can be understood, then, as animal-relative properties of the environment that constrain, not cause, behaviour (Chemero, 2003; Gibson, 1979; Heft, 2001; Shaw et al., 1982; Turvey, 1992; Warren, 1984, 2006).

While arguing for direct perception, Gibson (1966) highlighted the role of indirect, mediated perception. A distinction he made between perception of affordances, and perception based on second-hand information (manifest in words, pictures and symbols):

> "[…] a distinction will be made between perceptual cognition, or knowledge of the environment, and symbolic cognition, or knowledge *about* the environment. The former is a direct response to things based on stimulus information; the latter is an indirect response to things based on stimulus sources produced by another human individual. The information in the latter case is *coded*; in the former case it cannot be properly called that" (p. 91)

As noted, knowledge *of* the environment is reflected in the perception and actualisation of affordances. It is knowledge that is direct and unmediated, attuned through regular exposure, experience and participation with a performance environment (Gibson, 1966; Reed, 1996b). Exemplified by an experienced cricket umpire knowing *of* a ball 'nicking' the outside edge of a bat, or an experienced kayaker knowing *of* the currents while finding their way through rapids in a gorge. This inhabitant knowledge can be understood as being transformational (Ingold, 2013), as it is knowledge that an individual grows into, and concurrently grows into them through prolonged exposure to the constraints of a task and environment. For example, to progressively know the sound a ball makes when subtly nicking the outside edge of a cricket bat, an umpire would need to directly experience it while immersed within the various constraints of a cricket game. Through this immersion and exposure, they would learn *with* and *from* the environment, progressing into an ever-deepening resonation with its various sources of information that specify available affordances (Woods & Davids, 2021). This learning process would see them progressively grow a masterful attunement, allowing them to perceptually differentiate (Gibson, J.J. & Gibson, E.J., 1955) between the varying sights and sounds of a ball that has hit the cricketer's pad, glove, bat, or ground (while immersed in a confluence of other sounds), carefully attending to such key information to skilfully act.

Comparatively, knowledge *about* one's environment is information shared between people at second-hand, mediated through symbols, images and written on surfaces (Gibson, 1966, 1979). Given that such mediated information does not directly specify affordances within an

environment, its value resides within its 'referential meaning' (Araújo et al., 2019; Reed, 1991, 1996b). A game model commonly used in sport, for example, may instruct a footballer *about* where and how to pass the ball against a certain type of defence. Presumably, this is information that has been gained by a coach who has studied about the types and number of times a certain action has been performed by an opponent. This type of knowledge can be understood as being documentary (Ingold, 2013), gained after an event has occurred rather than grown during direct and practical participation with one's surrounds. This is not to disregard the importance of such documentary knowledge – information which could help with the design of practice tasks – but to recognise that such information is limited in its capacity to support one actually playing-in-the-game. Specifically, while such mediated information out-of-the-game may help narrow a player's search space before heading out to play (Silva et al., 2013), it cannot directly regulate their behaviour while *in* the game (O'Sullivan et al., 2021). This is because what regulates such behaviour in-game is continuously emerging information about key affordances, such as movements of opponents and teammates, weather conditions and other critical objects, surfaces and events, all of which cannot directly be perceived through the strategic scribing of a game model documented on a whiteboard (Araújo et al., 2019). These emerging events may be anticipated but are never guaranteed given the indeterminacy of the sporting landscape. Elsewhere, it has been argued that this distinction exemplifies a difference between knowing (*about*) the rules of a game or its strategic possibilities, and knowing (*of*) its opportunities for action to skilfully participate in it (Woods et al., 2021).

In light of this, I return to the question posed earlier – to correspond, do we profess *not* knowing? The answer, I think, sits within these ecological conceptualisations of knowledge, summarised by Gibson (1979) himself when he stated, "you do not have to classify and label things in order to perceive what they afford" (p. 134). In other words, you do not need to know 'about' (classify, label, categorise – *noun*) in order to know 'of' (perceive what things afford –

verb). From this ecological perspective, 'to know' is not a matter of attaching prior established meanings to objects, but of self-discovering their meaning in their very use. This crucial proposition leads to the second principle of this paper – in an ecologically dynamic world, *knowing about is subsequent to knowing of*. That is, "one has to have experiences *before* they can be shared" (Reed, 1996b, p. 2, my emphasis).

Such an appreciation links us back to the different sides of attention discussed earlier – to stretch toward, and to wait on. In doing so, it highlights a subtle, but important point of contention in Gibson's theory of affordances, which assumes an environment already furnished with objects waiting for a perceiver to use. Specifically, Ingold (2011) contends that in a world infinitely variegated, composite and continually becoming, 'to know of' would entail not just a masterful perceptual attunement to information specifying objects 'already there', but would accompany a patience and forbearance, waiting on the world to open up opportunities to carry on:

> "[T]he open world that creatures inhabit is not prepared for them in advance. It is continually coming into being around them. It is a world, that is, of formative and transformative *processes*" (p. 117)

What this means, is that a perceiver coming into being that inhabits a world in-becoming, *knows as they go*, not necessarily before they leave or once they return (Ingold, 2010, 2011; Woods et al., 2020a). In sport, this temporal determinacy of affordances is exemplified by a cricket batter attuned to the wrist and finger position of the bowler, waiting on information about the ball bowled *to know* what shot to play; a formula one driver attuned to the movements of other drivers on the track, waiting on information about a gap *to know* when to exploit it; a surfer attuned to the swell, waiting on information about the wave *to know* when to catch it. The athletes in each example are directly regulating their behaviour by corresponding with

emergent threads of inquiry; meaning they are 'knowing' (perceiving and acting) as they take up with their task in its unfolding. Stated differently, they are not passively undertaking preconceived steps established prior to, nor just interacting with objects fixed and ready-made, but are actively looking for an opening *in action* – a passage – as they improvise a way forward by corresponding with their performance environment. This itinerant process to knowing is what colleagues and I have referred to as *wayfinding* (see Woods et al., 2020b), and is why Ingold (2011, 2013) asserts that such skilled individuals 'grow with' and 'into' their knowledge – *knowing better, not more* than inexperienced companions[8].

For me, a profession of *not* knowing is a humble appreciation of the ecologically dynamic, open-ended and indeterminate world we inhabit; an appreciation of the different sides of the same coin that is attention. It is not a profession we, as sport scientists, should shy away from, but rather, embrace. Too often we confuse pre-packaged, documented and second-hand knowledge about an event as all one needs to find their way, degrading primary experience in the process (see Reed, 1996b). This is manifest in the growing trend to reduce, pin down, quantify, and analyse athlete behaviour, conflated as being 'the' way to undertake scientific inquiry in sport (Vaughan et al., 2019). But through the embracement of *not* knowing – of appreciating the indeterminacy of the world – we are drawn to appreciate the ongoing tentativeness of behaviour. This (at)tenativness, though, opens up a world of emergent possibility and synthesis, leading to the growth and transformation of our perceptual acuity – our *knowledge of* – by encouraging us to correspond with and weave together threads of inquiry we may not have otherwise encountered.

[8] In pushing against Western traditions of knowledge integration being vertical or lateral (representing categorical knowledge *about*), Ingold (2011) introduces the neologism of *alongly*, arguing that inhabitant knowledge *of* is grown 'along' paths of *movement*.

This idea leads to the last principle that I would like to explore, aligned to the last key property of correspondence. Specifically, if correspondence is *dialogical* – going on between and among participants – how, then, does one support another in detecting emergent threads of inquiry that open up as they go? A resolution to this question could sit within how we conceptualise education.

To guide

Given its eminence, it seems appropriate to start this section similar to the others, with an excerpt from Ingold – this time from his book, *Making: Anthropology, Archaeology, Art and Architecture*:

> "Had my companions offered formal *instruction* by explaining what to do, I would have had only the pretence of knowing, as I would find out the moment I tried to do as I was told. […] My companions did not inform me of *what* is there, to save me the trouble of having to inquire for myself. Rather, they told me *how I might find out*." (2013, p. 1 emphasis added and in original)

Before progressing on, I encourage readers to dwell in this excerpt, pondering whether this description resonates with mainstream perspectives of education in Western society. If, like me, you encountered the uncomfortable realisation that perhaps it does not, then it would be of little surprise to note that Ingold's accounts here were in reference to his time among the Saami people of north-eastern Finland – perhaps as far as possibly can be from the educational institutes those of us in the West are familiar with. This should not be read as an attack on such institutes, but as critique on our very (under)appreciation of the word 'education'.

To teach; to lead out

In a wonderful essay on educating gaze, educational philosopher Jan Masschelein (2010), draws our attention toward two distinctive etymologies of education. The first, *educare*,

roughly means ‘to teach’, and is perhaps an interpretation that most of us in the West have grown accustom. It represents a notion of becoming aware or conscious *about* a topic, to be seen as going from naïve to knowledgeable. Accordingly, it would be to view knowledge as an entity to be instilled into the minds of those less knowledgeable to be enlightened, presumably transmitted from an authoritative figure. This would view ‘being educated’ as being *more* knowledgeable *about* a topic such that one is able to assume some critical, all-knowing perspective.

An alternative to this somewhat conventional conceptualisation is that of *e-ducere*, roughly meaning ‘to lead out’ (Masschelein, 2010). This interpretation, in contrast, is not concerned with instilling or transmitting knowledge into the minds of those deemed to be ignorant, but is about “displacing our view” (Masschelein, 2010, p. 44). In other words, it is about exposing ourselves to the world, not to become ‘conscious’ or ‘aware’, but to grow an attentiveness to it. For example, where *educare* would focus on telling a naïve individual *about* what to see, do, feel and hear, *e-ducere* would lead a companion out into the world, showing them where they may like to start looking. This is because, according to Masschelein (2010), people do not become attentive to their world by just being told *about* it, but rather by experiencing it for themselves, exposing themselves to what is ‘(t)here’. Leading a companion out into the world is not so they can reach some prior established perspective – a destination – but so they can be displaced, opening up new opportunities for further exploration. This is the very reason why Masschelein (2010) emphasises this view of education is akin to a walk (or as I prefer, *a hike*) – where the goal is not to gain a more complete perspective, but rather, to get oneself out-of-position.

Guidance with(out) specification

Viewing education through such an etymology implicates how we would go about helping one to become attentive and (cor)responsive to the world they are led out into. Masschelein (2010)

argues that *e-ducere* requires a 'poor pedagogy', "which helps us to be attentive, which offers us the exercises of an ethos or attitude, not the rules of a profession or the codes of an institution" (p. 49). In other words, a pedagogical approach that does not focus on instructing about defined 'ways of doing', but one rooted in *guidance* toward where one may start their search. Espoused through the framework of ecological dynamics, it has been suggested that a poor pedagogical approach is underwritten by a softer (vis-à-vis louder) undertone (Rudd et al., 2021). This softened approach aims to expose inexperienced companions toward opportunities that may have otherwise remained hidden, supporting self-discovery by encouraging them to follow them up. Such pedagogical actions – which can take shape in many different forms like nudging, demonstrating or showing – are dialogical in that they continuously go on between an experienced and inexperienced companion as they head out into the world together, attending to each other and various threads of inquiry they encounter as they go. Importantly, as knowledge emerges through the correspondence between individuals, the experienced individual has as much to learn *from* their inexperienced companion as their inexperienced companion *from* them. The root of this dialogicality can be traced to the eminent philosopher John Dewey (1938/1997), who argued against the traditional Western philosophy of knowledge being possessed by a select few (i.e., 'the elite'), instead proposing that its growth emerges and flourishes within groups of people participating in a co-constructive way.

In contrast, louder pedagogical actions, like telling (about what to do and how to do it), risk centralising the 'instruction' in the educative process – focusing on a predetermined outcome or destination manifest in an established way of doing. Such an approach can be more authoritative, compelled by a certainty about the world, risking an uncoupling of perception from action. Meaning, an inexperienced individual would likely be more inclined to follow rules, regulations, and conventions that *specify for* (i.e., 'what and how'), rather than learning

to attend to things as they emerge. Interestingly, it appears that Ingold's companions understood this distinction well, choosing to guide him on where he may like to find out, as opposed to instructing him about how it *should* be done. This is because when understood as *e-ducere*, 'knowing' is something one has to experience from themselves (Ingold, 2013). This is not to downplay the role of the experienced companion, but to emphasise its difference when contrasted with *educare*. It is a difference exemplified between a coach who instructs an inexperienced surfer about how to catch a wave and what they should look like while attempting to surf it (perhaps articulated while on the shore), and a coach-as-companion who, while dwelling in the swell, guides an inexperienced surfer toward the various invitations the waves present, and where they may like to start exploring what surfing feels, looks, and sounds like to them. Importantly, these distinctions relate not just to the pedagogical actions, but to their intended use – that is, guidance *with* or *without* specification; a distinction poignantly noted by Reed (1996b):

> "Our guide does not *transmit* ideas to us, nor does she *impose* certain ways of thinking upon us. A good mentor helps us to learn things for ourselves, to learn to attend to the available information." (p. 113, emphasis added)

This proposition leads to the final principle of this paper; when viewed as *e-ducere*, experienced companions offer *guidance without specification* (Ingold, 2013). This is because 'knowing' is understood as a process of finding out for oneself – learning to pick up specifying information while being supported by a softly guiding companion.

Concluding remarks

This paper explored what it could mean to grow our knowledge of/in the ecologically dynamic world we inhabit. In weaving together key works of Ingold with those of Gibson and Masschelein, it proposed that in most aspects of life, knowledge is grown by corresponding

with emergent threads of inquiry. This proposition was underwritten by a presence in the present, coupled with a selective openness, where people progressively detect such threads through an attentiveness that is grown by being led out into the world, exposed to its rich variegations by experienced companions. Accordingly, three principles related to skilled behaviour, knowledge and education were reviewed: (i) mastery as submission to constraint; (ii) knowing about as subsequent to knowing of; (iii) guidance without specification. The relation between these principles, while woven throughout the paper, were emphasised within the sub-headed sections of each. Notably, 'to correspond', 'to know', 'to guide', were all presented as verbs. What knots these principles together, is *movement*.

As an aside, by embracing the indeterminacy of the niggling idea that is now this paper, emphasised at its beginning, I sought to encourage others in their journey toward Ithaka. Indeed, I am not the same sport scientist I was when I started writing this paper, as I have changed, grown and developed by corresponding with threads as the inquiry unfolded. These are threads that I did not necessarily plan to encounter nor set out to weave together, but things that I stumbled into while attentively following the niggling idea in its unfolding, shaped by my intentions and experiences. What you are reading, then, are the traces of my wayfinding. Perhaps, like Rebecca Solnit (2001) suggests, these traces could act as a guide, pointing out interesting things for you to follow up with while hiking along your path toward Ithaka. After all, it is a path rooted in correspondence, humility, companionship, and a genuine sense of mystery, coupled with an unceasing desire to 'find out'. What is oft-found, though, are just more questions, more compelling threads of inquiry to correspond with – a path not formed, *but forming*. In this ecologically dynamic world, 'knowing' is not an end point, a destination to be reached by following paths set out in advance by others. But, to me at least, it is better understood as an ongoing, guided, transformational *hike* through an infinitely variegated land*scape*.

Epilogue: Hiking along a path *toward Ithaka*

There is one last thread that I briefly follow up with as this paper draws to pause. It relates to an excerpt from Gibson's seminal text, *The Ecological Approach to Visual Perception*:

> "There is only one world, however diverse, and all animals live in it, although we humans have altered it to suit ourselves. We have done so wastefully, thoughtlessly, and if we do not mend our ways, fatally." (p. 130)

This excerpt compels us, as *corresponsible* organisms, to take greater care of the ecologically dynamic world we all inhabit, cherishing the engagements we share with all places and inhabitants. As a young sport scientist, I do worry about the future; an unsurety rooted in the expediting trend to mediate, cover over and commodify our correspondences. The natural world, though – *the environment we all inhabit* – is not 'out there' to be peered at through glass and screens, to be read about through words in print, or to be told about through lectures and presentations. But it is 'here', to be directly experienced. It is an inevitable downfall of this paper, then, that you are reading these sentiments through my words. Hopefully though, they have encouraged you to do away with them, to directly and primarily experience what the world has to share with you.

Perhaps then, this inquiry has encouraged you to reflect on your correspondences with the places familiar to you, as I did when describing my favourite hiking trails in the prologue. What I enjoy about these trails is not their determinacy, not a control that leads me to know in advance what I will see; what is over the hill; what is at the end. But it is in knowing that what I am to experience, I will never again – a realisation that grounds me in being present in the present – to be attentive, responsive and caring of the various threads I encounter in their unfolding. Corresponding with them to *know as I go*.

"Keep Ithaka always in your mind. But do not hurry the journey at all. Better if it lasts for years, so you are old by the time you reach the island, wealthy with all you have gained on the way, not expecting Ithaka to make you rich. Ithaka gave you the marvellous journey. Without it you would not have set out. It has nothing left to give you now. And if you find it poor, Ithaka won't have fooled you. Wise as you will have become, so full of experience, you will have understood by then what these Ithakas mean."

Acknowledgements

I would like to thank professor Keith Davids for his guidance on earlier versions of this paper. I would also like to thank my father for his thoughtful and guiding critiques on an earlier version of this paper. Along with my wonderful mother, I have much to thank them for – none more than setting up the conditions for my growth, which have led me to where I am today.

References

Araújo, D., Davids, K., & Renshaw, I. (2020). Cognition, emption and action in sport: an ecological dynamics perspective. In T. Gershon & R. C. Eklund (Eds.) *Handbook of Sport Psychology (4th ed.)*. John Wiley & Sons, pp. 535-555.

Araújo, D., Hristovski, R., Seifert, L., Carvalho, J., & Davids, K. (2019). Ecological cognition: expert decision-making behaviour in sport. *International Review of Sport and Exercise Psychology, 12*(1), 1-25. https://doi.org/10.1080/1750984X.2017.1349826

Bruineberg, J., & Rietveld, E. (2014). Self-organization, free energy minimization, and optimal grip on a field of affordances. *Frontiers in Human Neuroscience*. https://doi.org/10.3389/fnhum.2014.00599

Bruineberg, J., & Rietveld, E. (2019). What's inside your head once you've figure out what your head's inside of. *Ecological Psychology, 31*(3). https://doi.org/10.1080/10407413.2019.1615204

Chemero, A. (2003). An outline of a theory of affordances. *Ecological Psychology*, *15*(2). https://doi.org/10.1207/S15326969ECO1502_5

Clark, A. (1997). *Being there: putting brain, body and the world together again*. Cambridge, MA: MIT Press.

Davids, K., Araújo, D., Hristovski, R., Passos, P., & Chow, J. Y. (2012). Ecological dynamics and motor learning design in sport. In M. Williams, N. Hodges (Eds.) *Skill acquisition in sport: research, theory & practice (2nd ed.)*. Routledge, pp. 112-130.

Davids, K., Button, C., & Bennett, S. (2008). *Dynamics of skill acquisition: a constraints-led approach*. Human Kinetics.

Dewey, J. (1997). *Experience and Education*. Free Press (original work published in 1938)

Dreyfus, H. (2007). Why Heideggerian AI failed and how fixing it would require manking it more Heideggerian. *Philosophical Psychology, 20*(2), 247-268. https://doi.org/10.1080/09515080701239510

Edelman, G. M., & Gally, J. A. (2001). Degeneracy and complexity in biological systems. *PNAS, 98*(24), 13768-13768. https://doi.org/10.1073/pnas.231499798

Gibson, J. J. (1966). *The senses considered as perceptual systems*. Mifflin and Company

Gibson, J. J. (1979). *The ecological approach to visual perception*. Mifflin and Company

Gibson, J. J., & Gibson, E. J. (1955). Perceptual learning: differentiation or enrichment? *Psychological Review*, *62*(1), 32-41. https://doi.org/10.1037/h0048826

Heft, H. (2001). *Ecological psychology in context: James Gibson, Roger Barker, and the legacy of William James's radical empiricism*. Lawrence Erlbaum Associates Publishers.

595 Hristovski, R., Davids, K., & Araújo, D. (2009). Information for regulating action in sport:
596 metastability and emergence of tactical solutions under ecological constraints. In D. Araújo,
597 H. Ripoll, & M. Raab (Eds.) *Perspectives on cognition and action in sport*. Nova Science
598 Publishers, pp. 43-57.

599 Ingold, T. (2000). *The perception of the environment: essays on livelihood, dwelling and skill*.
600 Routledge.

601 Ingold, T. (2007). *Lines: a brief history*. Routledge.

602 Ingold, T. (2008). Bindings against boundaries: entanglements of life in an open world.
603 *Environment and Planning A: Economy and Space, 40*(8), 1796-1810.
604 https://doi.org/10.1068/a40156

605 Ingold, T. (2010). Footprints through the weather-world: walking, breathing, knowing. *Journal*
606 *of the Royal Anthropological Institute 16*(s1), S121-S139. https://doi.org/10.1111/j.1467-
607 9655.2010.01613.x

608 Ingold, T. (2013). *Making: Anthropology, Archaeology, Art and Architecture*. Routledge.

609 Ingold, T. (2015). *The life of lines*. Routledge.

610 Ingold, T. (2018). *Anthropology and/as education*. Routledge.

611 Ingold, T. (2020). *Correspondences*. John Wiley & Sons.

612 Juarrero, (1999). *Dynamics in action: intentional behaviour as a complex system*. MIT Press.

613 Kelso, J. A. S. (1995). *Dynamic patterns: the self-organization of brain and behavior*. MIT
614 Press.

615 Kelso, J. A. S. (2012). Multistability and metastability: understanding dynamic coordination in
616 the brain. *Philosophical Transactions of the Royal Society of London. Series B, Biological*
617 *Sciences*, 367(1591), 906-918

618 Love, S. C. (2017). An ecological description of jazz improvisation. *Psychomusicology: Music,*
619 *Mind, and Brain*, *27*(1), 31-44. https://dx.doi.org/10.1037/pmu0000173

620 Marsh, K. L. (2015). Social ecological context of conversing. *Ecological Psychology, 27*(4).
621 https://doi.org/10.1080/10407413.2015.1086229

622 Masschelein, J. (2010). E-ducating the gaze: the idea of a poor pedagogy. *Ethics and*
623 *Education, 5*(1), 43-53. https://doi.org/10.1080/17449641003590621

624 Masschelein, J., & Simons, M. (2013). *In defence of schools: a public issue*. E-ducation,
625 Culture & Society Publishers.

626 Morin, E. (2008). *On complexity*. Hampton Press.

627 O'Sullivan, M., Woods, C. T., Vaughan, J., & Davids, K. (2021). Towards a contemporary
628 player learning in development framework for sports practitioners. *International Journal of*
629 *Sports Science & Coaching*. https://doi.org/10.1177/17479541211002335

630 Olwig, K. (1996). Recovering the substantive nature of the landscape. *Annals of the Association*
631 *of American Geographers, 86*(4), 630-653.

632 Pinder, R., Renshaw, I., & Davids, K. (2012). Meta-stability and the emergent performance of
633 dynamic interceptive actions. *Journal of Science and Medicine in Sport, 15*(2), 437-443.

634 Reed, E. S. (1991). James Gibson's ecological approach to cognition. In: A. Still and A. Costall
635 (Eds.) *Against cognitivism: alternative foundations for cognitive psychology*. Harvester
636 Wheatsheaf.

637 Reed, E. S. (1993). The intention to use a specific affordance: a framework for psychology. In
638 R. Wozniak, & K. Fisscher (Eds.) *Development in context: acting and thinking in specific*
639 *environments* (pp. 45-75). Lawrence Erlbaum Associates.

640 Reed, E. S. (1996a). *Encountering the world: toward an ecological psychology*. Oxford
641 University Press.

642 Reed, E. S. (1996b). *The necessity of experience*. Yale University Press.

643 Rietveld, E., & Kiverstein, J. (2014). A rich landscape of affordances. *Ecological Psychology,*
644 *26*(4), 325-352. https://doi.org/10.1080/10407413.2014.958035

645 Rudd, J. R., Woods, C., Correia, V., Seifert, L., & Davids, K. (2021). An ecological dynamics
646 conceptualisation of physical 'education': where we have been and where we could go next.
647 *Physical Education and Sport Pedagogy*, *26*(3).
648 https://doi.org/10.1080/17408989.2021.1886271

649 Shaw, R., Turvey, M., & Mace, W. (1982). Ecological psychology: the consequence of a
650 commitment to realism. In W. Weimer & D. Palermo (Eds.) *Cognition and the symbolic*
651 *processes* (pp. 159–226). Lawrence Erlbaum Associates.

652 Silva, P., Garganta, J., Araújo, D., Davids, K., & Aguiar, P. (2016). Shared knowledge or
653 shared affordances? Insights from an ecological dynamics approach to team coordination in
654 sports. *Sports Medicine, 43*(9), 765-777. https://doi.org/10.1007/s40279-013-0070-9

655 Solnit, R. (2001). *Wanderlust: a history of walking*. Penguin Books.

656 Teques, P., Araújo, D., Seifert, L., del Campo, V. L., & Davids, K. (2017). The resonant
657 system: linking brain-body-environment in sport performance. *Progress in Brain Research,*
658 *234*, 33-52. https://doi.org/10.1016/bs.pbr.2017.06.001

Turvey, M. T. (1992). Affordances and prospective control: an outline of the ontology. *Ecological psychology, 4*(3), 173-187. https://doi.org/10.1207/s153269eco0403_3

van Dijk, L. (2021). Psychology in an indeterminate world. *Perspectives on Psychological Science, 16*(3), 577-589. https://doi.org/10.1177/1745691620958005

van Dijk, L., & Rietveld, E. (2017). Foregrounding sociomaterial practice in our understanding of affordances: the skilled intentionality framework. *Frontiers in Psychology, 7*. https://doi.org/10.3389/fpsyg.2016.01969

Vaughan, J., Mallett, C. J., Davids, K., Potrac, P., & López-Felip, M. A. (2019). Developing creativity to enhance human potential in sport: a wicked transdisciplinary challenge. *Frontiers in Psychology*. https://doi.10.3389/fpsyg.2019.02090

Warren, W. H. (1984). Perceiving affordances: visual guidance of stair climbing. *Journal of Experimental Psychology: Human Perception and Performance, 10*(5), 683-703. https://doi.org/10.1037/0096-1523.10.5.683

Warren, W. H. (2006). The dynamics of perception and action. *Psychological Reviews, 113*(2), 358-389. https://doi.org/10.1037/0033-295X.113.2.358

Whitehead, A. N. (1919). *The concept of nature, Tarner lectures delivered in Trinity College, November, 1919*. Franklin Classics Trade Press.

Withagen, R., de Poel, H. J., Araújo, D., & Pepping, G. J. (2012). Affordances can invite behaviour: reconsidering the relationship between affordances and agency. *New Ideas in Psychology, 30*(2), 250-258. https://doi.org/10.1016/j.newideapsych.2011.12.003

679 Woods, C. T., & Davids, K. (2021). “You look at an ocean; I see the rips, hear the waves, and
680 feel the currents”: Dwelling and the growth of enskiled inhabitant knowledge. *Ecological*
681 *Psychology*. https://doi.org/10.1080/10407413.2021.1965481

682 Woods, C. T., Robertson, S., Rudd, J., Araújo, D., & Davids, K. (2020a). ‘Knowing as we go’:
683 a hunter-gatherer behavioural model to guide innovation in sport science. *Sports Medicine*
684 *Open, 6*(52). https://doi.org/10.1186/s40798-020-00281-8

685 Woods, C. T., Rudd, J., Gray, R., & Davids K. (2021). Enskilment: an ecological-
686 anthropological worldview of skill, learning and education in sport. *Sports Medicine Open,*
687 *7*(33). https://doi.org/10.1186/s40798-021-00326-6

688 Woods, C. T., Rudd, J., Robertson, S, & Davids, K. (2020b). Wayfinding: how ecological
689 perspectives of navigating dynamic environments can enrich our understanding of the learner
690 and the learning process in sport. *Sports Medicine Open*, 6(51).
691 https://doi.org/10.1186/s40798-020-00280-9