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Not just to know more, but to also know better: How data analysis-synthesis can be woven into sport science practiced as an art of inquiry

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ABSTRACT

Utilising novel ways of knowing, aligned with an ecological approach, the Learning in Development Research Framework (LDRF) has been introduced as a different way to guide research and practice in sport. A central feature of this framework is an appreciation of researcher embeddedness; positioned as an inhabitant who follows along with the unfolding inquiry. This positioning is integral for enriching ones understanding of the relations between socio-cultural constraints and affordances for skill learning within a sports organisation. Moreover, the notion of embeddedness foregrounds the ongoing nature of inquiry when practiced as *an art of inquiry*. In an effort to extend these ideas, this paper highlights how a phronetic iterative approach to data analysis-synthesis could be undertaken, while ensuring that the researcher remains 'in touch' with a phenomenon, and thus faithful to key tenets of research practiced as an art of inquiry. To illustrate this, we present a 'walk-through' from a recent LDRF study. Rather than focusing on data collection or recorded observations made from afar, this walk-through shows how a researcher, practicing an art of inquiry, can grow knowledge *of* and *with* the phenomena, enriching the evolution of practice and performance from within an ecology of relations.

Introduction

In sport science, research has historically held a biased preference for organism-centered[1] explanations of performance (Davids & Araújo, 2010). This is characterized by a relatively unchallenged path dependency of seventeenth-century scientific rationalising – i.e. the Newtonian/Cartesian paradigm (see Montuori, 2011; Reed 1996) – which has bled into sport science and many of its sub-disciplines, shaping research methods and practical interventions (Vaughan et al., 2019; Woods & Davids, 2022). Path dependency can imply an ideological inertia, shielding the inherited beliefs about how skill is understood and 'acquired' (Kiely, 2018). O'Sullivan et al. (2023) illustrated how education courses in Swedish youth football, for example, embodied a 'control over context' (limiting unpredictability) path dependency that aligned to a deterministic and mechanistic view of human

behaviour. Indeed, mechanistic approaches to coaching and reductionist sport science perspectives have long been criticized for holding the assumption that human behavior can be conceptualized as being 'machine-like' and can be predicted and controlled in highly precise ways (Bowes & Jones, 2006; Davids et al., 1994; Vaughan et al., 2019).

While undoubtedly leading to many interesting discoveries, this narrowed and asymmetric view of performance has led many away from the context of behaviour (Davids & Araújo, 2010), inclusive of socio-cultural constraints (O'Sullivan et al., 2021). This is quite pertinent when we consider that socio-cultural constraints influence practices in ways that differ from context to context, as societies influence, define and engage in sport in varying ways (Messner & Musto, 2016). Moreover, such de-contextualization in research has likely led many down the path of determinism, where athlete performance is analyzed through a linear cause–effect paradigm. In this way, phenomena are viewed as 'objects of analysis' that are to be studied *about*, leading to the production and consumption of information at second-hand (cf. Woods & Davids, 2022). Here, we hold that approaches disregarding the importance of context and the layered complexity of the environment need to be questioned.

Ecological dynamics has emerged as a guiding theoretical framework challenging such organismic asymmetries, informing new approaches to research and athlete development (Button et al., 2020). This framework proposes that skillful behaviour emerges from the complex, dynamic relations sustained between an athlete and environment, and views learning as occurring in the midst of ongoing developmental changes within specific socio-cultural contexts (Adolph, 2019; O'Sullivan et al., 2021). Considering that this perspective offers potential for a myriad of complex and ill-defined challenges, there is a need for an approach to sport science that radically broadens current ways of knowing (cf. Rothwell et al., 2018; Uehara et al., 2018; Vaughan et al., 2022; Woods et al., 2022) and guides reliable ways of conducting research *in* practice (Woods & Davids, 2022).

To meet these challenges, Woods and Davids (2022) proposed that researchers embed themselves in the broader ecology of a phenomena of interest, practicing what they refer to as an 'art of inquiry'.[2] Practiced as such, researchers move from passive bystanders, to *observant participants* who think *with* and *through* the inquiry as it unfolds. Along similar lines, O'Sullivan et al. (2021, 2023) proposed the Learning in Development Research Framework (LDRF) as a deeply contextualised, transdisciplinary approach to action research. Foregrounding aspects of qualitative inquiry, the LDRF promotes an appreciation of research that positions the scientist *with-in* a sports organisation (O'Sullivan et al., 2021; Vaughan et al., 2022; Woods et al., 2021). Thus, the LDRF extends recent calls for researchers to engage directly with the phenomenon through prolonged periods of *dwelling* (Tracy, 2010; Woods & Davids, 2021, 2022).

While such calls are being heard, to date, there remains a lack of research guiding how LDRF scientists practicing an art of inquiry could go about data analysis-synthesis. Here, we aim to address this by presenting a data analysis-synthesis 'walk-through', grounded in the work of O'Sullivan et al. (2023). In doing so, we embody the below words of Woods and Davids (2022), showing how a researcher does:

> … not just passively document and/or analyse events – leading to the production of knowledge about – but actively transforms *with* what they directly experience and discover for themselves – growing knowledge of and with the phenomena in specific contexts of practice and performance (p. 588, emphasis in original).

The overview of this paper is as follows. First, we provide brief insight to the key tenets of the LDRF, exploring how knowledge is not just something accumulated, but also something refined – *we do not just know more, but also better*. This excursus foregrounds the second section of this paper, in which we present a data analysis-synthesis 'walk-through'. In this section, we show how a *phronetic iterative approach* to data analysis-synthesis can be carried out, ensuring that the researcher remains 'in touch' with a phenomenon and thus faithful to key tenets of research practiced as an art of inquiry (Woods & Davids, 2022).

The learning in development research framework

The LDRF utilizes novel ways of knowing, aligned with an ecological perspective, to guide both research and practice within sports organizations (O'Sullivan et al., 2021, 2023; Vaughan et al., 2022). It advocates for researcher embeddedness, which is complemented by an action cycle – defined as a probe (Snowden & Boone, 2007; also see Woods et al., 2022) – that aims to implement findings (O'Sullivan et al., 2021). Providing a rich conceptual framework, the Skilled Intentionality Framework (SIF) helps to support this immersion by foregrounding aspects of qualitative inquiry related to specific historical and socio-cultural contexts, coupling such things to behavior and learning (van Dijk & Rietveld, 2017). Informed by findings, interventions can be devised to probe the system at macro or microsystem levels (e.g. organizational structure within a club or how coaches might aim to shape athletes' intentions in order to educate attention, see O'Sullivan et al., 2021). For example, pedagogical probes could aim to amplify or dampen specific socio-cultural constraints (coach centered pedagogy) that are shaping the relevant fields of opportunities or affordances for action in sport organizations (Vaughan et al., 2019). Another example could be avoiding or dampening language that reinforces ideas and path-dependent narratives associated with socio-cultural constraints, like for instance, referring to under nine football players as 'elite' (see Kirkland & O'Sullivan, 2018).

This means that in the LDRF, inquiry is ongoing, suspended in a constant state of flux. This approach can illuminate how a player development environment has adapted to, and is shaped by, socio-cultural constraints that guide the perception of affordances (invitations for action; Withagen et al., 2012) within a 'form of life' (O'Sullivan et al., 2023; Rietveld & Kiverstein, 2014). Consisting of values, beliefs and practices that continually shape how people live, the Wittgenstein (1953) notion of 'form of life' helps us to understand the myriad of socio-cultural constraints that can influence an athlete's responsiveness to affordances (Vaughan et al., 2021). Conceptualised as something that is deeply acultured and often taken for granted, a form of life can define dominant ways of doing and knowing, as well as intentionality, or value-directedness (Rietveld & Kiverstein, 2014; Vaughan et al., 2021).

The LDRF concurrently draws from an ecological dynamics rationale (Button et al., 2020), which starts from the basis that individuals perceive the environment in relation to its functionality, its meaningfulness, and its value detected in specifying information (Gibson, 1979). Described as properties of the individual-environment system that do not cause behavior but constrain it (Gibson, 1979), the LDRF extends the more traditional action-scaled view on affordances, embracing Rietveld and Kiverstein's (2014) suggestion that due to their relational nature, the variety of affordances are as rich and varied as the actions socialised by socio-cultural practices. This helps avoid problems with defining skill development as an internal characteristic of an individual or of the environment and allows an extended view of athlete-environment intentionality (see Vaughan et al., 2021). The intentionality of any human-environment system frames an interdependent and constitutive relationship (van Dijk & Rietveld, 2017). In other words:

> Intentionality characterizes the system, not just biological organisms within the system. Thus, intentionality in the sense of value-directedness characterizes environmental structures [i.e. organizational structures] and processes [i.e. training sessions] as much as it does the organisms [football players] who shape and are shaped [e.g. skill development] by those structures and processes. This implies that values are necessary constraints on both the constitution and the selection of affordances (Hodges & Baron, 1992, pp. 269–270, text in brackets added).

Foregrounding the notion of constitutive socio-material entanglement within the SIF, the LDRF can help explain the actively dynamic reality of life. More directly, it can provide a perspective on the extent to which athlete development environments are socio-material and constitutively entangled (deeply nested and embedded) within broader socio-cultural and historical contexts and structures (Henriksen, 2010; Henriksen & Stambulova, 2017). Understanding these ideas will help us focus on how context changes everything (Juarrero, 1999). This worldview aims to demonstrate how the ways which we live (forms of life), the practices we partake in (sports training methods), the

affordances we perceive (invitations for action in these contexts) and the skills we develop (passing, dribbling), are constitutive relations and aspects of a holistic system that continuously form each other (O'Sullivan et al., 2021; van Dijk & Rietveld, 2017). For example, referring to Winner (2001), it can be argued that the Dutch playing style of 'total football' emerged within a specific socio-cultural context as an expression of its culture, art, architecture, landscape, history, geometry and dance, which built on a new theory of flexible and creative space.[3] Here, players' perceptual systems and effectivities developed in interaction with an intention to create a diverse range of passing and dribbling opportunities to find, create and exploit space. So, while a form of life influences the way athlete development frameworks are implemented, the SIF can illuminate which socio-cultural and historical constraints contribute to the value-directedness shaping the intentions of coaches and players.

Knowing not only more, but also coming to know better

The ecological psychologist James Gibson (1966) introduced an important conceptualisation of knowledge by proposing a distinction referred to as knowledge *of* and knowledge *about* the environment. The latter, Gibson (1966) suggested, is knowledge that is gained at second-hand, oft produced by another human individual. By contrast, the former is knowledge at first-hand, grown through a perceptual system attuned to specifying information disposing the layout of an environment in relation to perceivers point of observation (Gibson, 1966; also see Woods et al., 2020b). It is important to point out here that it is not our intention to dichotomise these knowledge types in forthcoming sections. Rather, our aim is to show that knowing *about* one's environment is not the same as knowing *of* it. Further, while both types of knowledge are of use in supporting human behaviour, a concern raised by Woods and Davids (2022) is that the predominant method of inquiry within the sport sciences has been built upon a foundation of the latter, where phenomena are only known *about* by way of second-hand information.

Here, we show how the LDRF addresses this concern, encouraging researchers to not only know more (*about*; something accumulated), but also better (*of*; something refined). First, to offer a deeply contextualised and continuous analysis and assessment of a form of life, even while findings are being implemented, LDRF researchers are encouraged to use a combination of action research probes. To grow knowledge *of* the phenomenon, the following strategies of inquiry are suggested:

- First, undertake a contextual historical analysis to garner deeper insight to the overarching ecological context (macrosystem) that conveys the information, ideology and values that influence organisational structures (i.e. roles, responsibilities, tasks), and events in the embedded microsystems (i.e. coaching sessions) where athlete development takes place.
- Second, observe the goings on as a participant responsive to the phenomena at varying temporal scales.
- Third, embrace the unfolding of interviews-as-conversations that can also spontaneously emerge in the context of participant observation.

As is woven through these three strategies, LDRF researchers are encouraged to observe and participate in the phenomenon's natural ecology of relations. Participant observation can support on-field education, where the integration of research (action/probes) may enable deeper insights into the functioning relationships, rules and peculiarities of a place and its inhabitants (O'Sullivan et al., 2023).

It is important to point out, however, that the LDRF does not deny the role, or benefit, of second-hand information; just that it does not determine observations *for* the researcher (Woods & Davids, 2022). For example, Araújo et al. (2010) noted that knowledge *of* the environment may be supported through communication *about* its features and can play an important role in educating attention toward key affordances. By performing a contextual historical analysis, a researcher will likely

appreciate that training and athlete performance does not take place in a socio-cultural vacuum but are deeply entangled within meaningful contexts and values of a broader societal form of life (Juarrero, 2023; O'Sullivan et al., 2023). Ethnography, framed by a contextual historical analysis providing knowledge *about* the environment, can thus be complemented by, and synthesised with, experiential and empirical knowledge *of* the environment, grown through *dwelling* (Woods & Davids, 2021). This allows the researcher during data analysis-synthesis to consider how interconnected social, cultural, political and historical constraints, specific to a place, can play an important role in shaping the way coaches are educated and how athletes engage with performance environments (Rothwell et al., 2018). Moreover, it can illustrate how skill learning in the midst of development is an interdependent manifestation of the wider environment; a meshwork that includes constraints emerging from the macrosystem and other socio-cultural practices.

Toward an embedded approach to analysis-synthesis

Much of the qualitative research carried out within social science has been characterized by the sequential nature of data collection, analysis and synthesis (Emerson et al., 2011). As highlighted by Woods and Davids (2022), it is these types of official protocols that inadvertently promote 'detached inquiry', constraining the ways in which scientists can 'know' the very world of which they are part. For example, data analysis from a more detached perspective embodies what Woods and Davids (2022, p. 584) refer to as a 'drone perspective of the factual landscape'. According to this perspective, knowledge *about* the phenomena is produced through classification and categorization, in which the researcher analyses phenomena:

> … not as ongoing things on the cusp of becoming, temporally stretched in-between dynamic states, but as objects that are fixed and static waiting to be split up, categorised into pieces by way of analytics; explained away by being placed into disciplines or sub-disciplinary frameworks. (Woods & Davids, 2022, p. 584)

The LDRF foregrounds research that is undergone in a directionality that Woods et al. (2022, p. 2) have referred to as 'longitudinal' – meaning the researcher responsively moves *along with* the unfolding inquiry, growing knowledge *of* its ebbs and flows as they go. This means that how the researcher comes to know the phenomena of interest, and how they learn to correspond with its becoming, is through *dwelling*. This is an important aspect aligned with the LDRF, encouraging the researcher to maintain a perceptual attunement to that which is of interest.

O'Sullivan et al. (2023) gave an illustration of the non-linearity and reflexivity of both the research and analysis process. In their study at a professional youth football club in Sweden, they highlighted how an iterative process to data generation, consolidation, analysis, and synthesis informed the refinement and development of system probes (action). Following a brief overview of this work, we will next show how data analysis-synthesis can be used as part of the ongoing-ness of inquiry to offer a deeply contextualised and continuous analysis of a form of life, even while probes are being implemented. We will illustrate how a researcher can maintain proximity during data analysis to further support the idea of not just passively producing knowledge *about*, but growing knowledge *of* and *with* the phenomena to guide the evolution of practice and performance.

Case study overview and research questions

The study of O'Sullivan et al. (2023) was carried out at Allmänna Idrottsklubben (AIK) youth football club in Stockholm, Sweden, which provided a richly unique socio-cultural and historical backdrop. The primary research question that these authors asked was:

(i) *Is there a connection between young players interactions with relevant fields of affordances and the intentions of coaches at AIK youth football, with the socio-cultural and historical context?*

As the inquiry unfolded, and as will become apparent in the following sections, this primary question led to the development of two subsequent research questions:

(ii) *To what extent is the value-directedness (intentionality) that players experience on the football pitch related to the macrosystems, socio-cultural constraints, and forms of life that influence responsiveness to affordances?*
(iii) *What are the 'sticky' socially and culturally constructed values, beliefs and attitudes contributing to a system inertia?*

An extended version of the data analysis walk-through is available as supplementary material. It is important to point out that even though, for the sake of clarity, the data analysis-synthesis walk-through is presented in a linear and sequential fashion, the data collected did not follow a linear path in the analysis. Rather, the research process was a non-linear, non-sequential process based on the notion of reflexivity (Dowling, 2008), where the research procedures were applied in a non-linear fashion, becoming iterative and interrelated to each other (Uehara et al., 2014).

Case study walk-through

We now walk-through how a *phronetic iterative approach* can be used to guide data analysis-synthesis for LDRF researchers practicing an art of inquiry. First, a phronetic iterative approach alternates between emergent emic readings of data and an etic use of existing models and theories (Tracy, 2018). Analysis iterates between: (1) data generation, (2) scrutinising emergent findings from the data, and (3) consulting existing theoretical and conceptual frameworks (Tracy, 2018). The ethnographic process supports the commencement of data analysis to begin with data generation (Lecompte & Schensul, 1999), and can help in identifying promising directions of research (Tracy, 2018).

Initial analysis begins with a formal process of interpretation, and a descriptive 'primary cycle coding' or 'open coding' process (Tracy, 2018, p. 65). In the secondary coding cycle, the researcher begins to consolidate, organise and synthesise codes, a move which requires theoretical consideration (Tracy, 2018). In particular, an understanding of theory can provide a foundation for building explanations of observations, as well as informing new lines of inquiry to participate within.

Data analysis and synthesis

To help unpack the primary research question, the SIF, in combination with ethnographic strategies (contextual historical analysis, observation, interviews, field notes), was utilized. Analysis began with data generation to help identify promising areas of research (Emerson et al., 2011; Lester & Anders, 2018). Initially, first-level descriptive codes were generated to capture the main ingredients of the data (see Table 1).

The secondary level coding cycle was used to interpret, organise and synthesise codes, moving beyond descriptive first-level codes and towards more focused coded themes that required interpretation and theoretical considerations. Smaller first-level codes were grouped in a larger hierarchical (umbrella) category (Table 2).

To delve further into the 'how', 'why', and 'because' during second-cycle coding activities, data emerging in the microsystem was analysed and synthesised with the data collected via document analysis that informed the historical contextual analysis (macrosystem). This allowed for the triangulation of emerging codes using multiple sources of information, gaining varied perspectives on what is happening in the phenomena, helping form clear, conceptually interesting and contextually rich themes. Embedded here is the appreciation that training sessions do not take place in a socio-cultural vacuum, but are deeply entangled within meaningful contexts of a broader societal form of life (Juarrero, 2023; O'Sullivan et al., 2023). To better understand athlete development in and through sport, culture and context matter (Araújo et al., 2019; Vaughan et al., 2022). Therefore, data from

Table 1. Examples of raw data and initial first-level descriptive codes.

21-08-2018 Skytteholms IP pitch D Something happens, one parent looks up to the night sky, while the parent next to him stares at him and opens his arms, then drops his head and shakes it. With the end of the season approaching in two months, and an immanent selection, de-selection process approaching the intensity, or the 'tempo' is quite high. The game-based part of the sessions seems to be just constant transitions. According to Vincent, the early part of the session was a lot of repetitive passing drills followed by 1v1's with no consequence (once the attacker lost the ball the 1v1 was over). Vincent: This is more like a tennis match Mark: The coach seems to be willing them on, Kör! Kör! Kör!(Go! Go! Go!). Vincent: This, I guess is what performance anxiety looks like coming up to the end of the academy season. They are competing against each other, even when in the same team, instead of collaborating to make each other better.	ANXIOUS BODY- LANGUAGE SELECTION DE-SELECTION INTENSITY-TEMPO STRESS REPETITIVE PASSING DRILLS-ONE DIRECTION CONSTANT TRANSITIONS COACH VERBAL PUSHING 'WHAT PERFORMANCE ANXIETY LOOKS LIKE' INTERNAL COMPETITION
Coach A You see when I began there was a little nerve that influenced pedagogy. You were forced to have results even at 9, 10 years. This influenced your pedagogy a lot and what you do. There was a lot of ABC passing, if you have the ball here you pass there or perhaps there – you should be there when the ball is there, which game short-term results but influenced players over time.	NERVE RESULTS PEDAGOGY PREDETERMINED PASSING EXPLICIT INSTRUCTIONS
Coach H Through a lot of years in football. My feeling is that parents who don't have proper insight into development, they like the look of organisation. They like the look of control, which is easy to get because you can put them in a line and do a passing drill and for someone who doesn't have insight, it can look very, very good.	PARENTS ASSUMPTIONS ORDER-'THEY LIKE THE LOOK OF CONTROL'
Coach G The technique register, and its micromanagement, was absolutely seen in AIK, in the everyday practices	TECHNIQUE REGISTER COACH CONTROL
11-11-2018 AIK head office Coach C: We had an 'overlap' themed session … we got criticized for a lack of successful overlaps. The coach educator assumed that the success of an overlap was when the overlapping player received the ball. The idea of a successful overlap is not about receiving the ball but also about distracting the defenders, pull them out of position and create other opportunities i.e. a gap to pass or dribble through as the defense is moved out of position by the overlap. We were also criticised for not clearly mentioning the theme of the session in the introduction.	THEMED SESSION CRITICISED ASSUMING PREDEFINED OUTCOMES CONTRASTING OPINIONS CRITICISED THEME
14-02-2019 Huvudstafältet IP Mats: 'They are just playing football; they can do this on their own, this is not serious training' Mark: What does serious football training look like at this age? Arion (interrupts): Well, the coach doesn't seem to be interested, it doesn't look like he is in control. It is like a 'sandlåda' (playground sandbox), its chaos, kids can do what they want when playing these games. He should be in there telling them what to do! Mats: We call this 'saft and bulle' (child's soft drink and buns) training.	PERCEPTION OF TRAINING NOT SERIOUS CONTROL 'SANDLÅDA'-NOT SERIOUS SAFT OCH BULLE

the microsystem of practice synthesised with data from the historical contextual analysis can be understood as an important part of maintaining correspondence with the specific ecology of relations. Table 3 and Table 4 shows data type and data sources that were synthesised during second-cycle coding.

A feature of the secondary-cycle coding that served to focus the analysis-synthesis towards answering the first research question was identifying which codes are most appropriate to probe (Tracy & Hinrichs, 2017). Returning to the data, these identified codes were then viewed in a more etic, deductive manner. The focus of research was then gradually narrowed to alter between emic or emergent readings of the data and etic use of existing models, explanations and theories. In particular, an understanding of theory provided a foundation for explaining observations, as well as informing new lines of inquiry (see 'study overview' in the Supplementary Material). Exemplifying how the researcher remained 'in touch' with the phenomenon to offer a deeply contextualised and continuous analysis, the second research question evolved and was developed during the

Table 2. Examples of larger hierarchical umbrella codes.

Umbrella code	Code description	Examples
Coach pedagogy PASSING- PATTERNS ISOLATED DRILLS 'FOCUS'- ORDER EXPLICIT INSTRUCTIONS STRESS-ANXIETY COACH CONTOL GAMES BASED PREDEFINED -OUTCOMES PLAY COACHES WAY	Describes the various types of observed practices, pedagogical approaches and coach behaviour at AIK youth football.	… there are a lot of predetermined passing patterns that are practiced in isolation of opponents and then put into a game. If the players don't play out from the back the exact way the coach wants them to, then the play gets stopped. Tonight, I saw a very animated coach who, during an 8v8 practice was moving players around like chess pieces The sessions look lethargic and pretty much isolated technical work for over 45 min. Coaches shouting focus, focus as kids wait in line and tempo, tempo, with speed (med fart!) as they dribble to a cone and back or work on a passing dril without opponents.
Parents MONOTORING BEST WITH BEST 'LOSE BEST PLAYERS' EXPECTATIONS RESULTS ANXIETY STATUS MAINTENANCE	Describes parents behaviours, opinions and insights into practices at the club.	It doesn't look like he is in control. It is like a 'sandlåda', its chaos, kids can do what they want when playing these games. He should be in there telling them what to do! But we will lose the best players to other clubs that select early – if we don't start selecting players early again
Coach insights TECHNIQUE REGISTER COACH CONTROL EXPECTATIONS PLAY THE COACHES WAY PREDEFINED OUTCOMES RESULTS ANXIETY STATUS MAINTENANCE	Describes coaches opinions and insights into club in general, on pitch practice	The technique register, and its micromanagement, was absolutely seen in AIK, in the everyday practices … a lot of decisions were pre-decided decisions [in training and in games]. Through a lot of years in football. My feeling is that parents who don't have proper insight into development, they like the look of organisation.
Structure and impact of wider influences 'NERVE' ANXIETY STATUS MAINTENANCE BEST WITH THE BEST RESULTS COACH CONTROL	Significant utterances and/or nonverbal actions or practices that resonate with and/or suggest wider influences	'You see when I began it was …. there was a little nerve that influenced pedagogy. You were forced to have results even at 9, 10 years. This influenced your pedagogy a lot and what you do.' There is a structural problem in Stockholm football that invites the possibilities for the development of an environment that is not child/player cantered to develop in clubs. This also influences parents and coaches who in an effort to get results, select the best as early as possible, creating teams within a team.
Coach education TEKNIQUE REGISTER THEME COACH CONTROL PREDEFINED OUTCOMES PLAY THE COACHES WAY	Significant utterances, experiences or references to both old (pre-2014) and new SvFF coach education courses	It was as if the trainer had the solution in the form of this folder [technique register]. You line up the kids, say pairs facing each other, throw a ball to each other, then you would pass the ball back with a volley.The players didn't get to express themselves very much, I had shown then how to do it the correct way. We had an 'overlap' themed session. When we were finished, we were asked by the coach educators if we were happy with what we saw. We said relatively happy! Then we got criticized for a lack of successful overlaps. The coach educator assumed that the success of an overlap was when the overlapping player received the ball. The idea of a successful overlap is not about receiving the ball but also about distracting the defenders, pull them out of position and create other opportunities. We were also criticised for not clearly mentioning the theme of the session in the introduction.

Umbrella code	Code description	Examples
Selection LOSE BEST PLAYERS STATUS MAINTENANCE 'PERFORMANCE ANXIETY IN ACTION' RESULTS	Utterances or insights gained in the field in relation to AIK decision and selection and de-selection.	This, I guess is what performance anxiety looks like coming up to the end of the academy season. They are competing against each other, even when in the same team, instead of collaborating to make each other better. 'I have had a few parents ask me about 'nivåindelning' (splitting the kids into ability levels- best with best). His feeling was that 'this is about winning games for their own child.'

Table 3. Data type and sources that were synthesised during second-cycle coding.

Analysis level	Data type	Data sources
Macro	Formal Texts	NGB guidelines and reports (e.g. Swedish Sports Council documents) SvFF coach education material Nordic Sports Forum Archive Center for Sports Science (CIF) archive
	Media sources and Supplementary texts	Newspapers (eg.., Dagens Nyheter, Expressen, Aftonbladet) Online websites and blogs (e.g. Svenskafans, Norsk Fotballtrenerforening, SEF, idrottensaffär, SvFF, Swedish Sports Council, Fotbollskanalen, TV)
Micro	Observation, field notes Interviews, informal conversations	Coaches, players, parents, club leaders, video footage

data analysis-synthesis: *to what extent is the value-directedness (intentionality) that players experience on the football pitch related to the macrosystems, socio-cultural constraints, and forms of life that influence responsiveness to affordances?*

To respond to this question, the utilization of interpretative creativity and existing theories helped to deductively guide, organise, and locate the data within this broader ecological context. For example, the use of the broad macrosystem dimension, including a range of putative or generative influences (such as political, economic and socio-cultural) that developmentally instigate belief systems were captured as ethnographic themes and further interpreted as an interconnected system of 'value directedness' that cascaded through contexts. This is also captured in the analytical narrative presented later.

Key findings of the first research cycle

Findings from the first research cycle highlighted how multiple intertwined constraints were shaping the ecological niche at AIK youth football. This helped create a context that led to the emergence of context-dependent constraints (e.g. types of task designs, development pathways, expectations) that shaped the value-directedness experienced by players. Through a form of 'control over context', coaches appeared to be over-constraining task designs in ways that players could only respond to specifically amplified affordances. This indicated a need to dampen the influence of the pervasive organisational approaches that were acting as socio-cultural constraints, shaping the intentions and attention of players and coaches. A list of related themes that constitute, arise from and reinforce 'control over context' are presented in Table 5 and Table 6.

Control over context

The data provided information to help explain the central phenomenon of the study captured in the meta theme 'control over context'. The location of this theme aims to represent a coherence of data,

Table 4. Examples of raw data that informed the historical contextual analysis (macro) that was analysed alongside, and synthesised with the data emerging in the micro.

There is currently a professionalisation of Swedish youth football with foreign big teams..The ideals that Swedish youth football movement is based on has been split in two. On one side are international big clubs, elitist academies and money-hungry agents who have turned sports into a market and children into consumers and products. There is an evolving culture of status among parents that have a 'high performing child'. (Document analysis: Aftonbladet article: Blivit status att ha ett presterande barn, November 24, 2019. Translated from Swedish)	PROFFESIONALISATION MOVEMENT DIVIDED AGENTS/SCOUTS BUSINESS MARKET STATUS-'HIGH PERFORMING CHILD'
… discussed both within Swedish sports research and in the media. In this context, concepts such as 'curling parent' and 'helicopter parents' have emerged and been lively debated. In short, it can be said that these parenting styles mean that the children's path forward in life is 'swept' and 'supervised' so that they avoid encountering resistance and problems. (Document analysis: Centrum för idrottsforskning, 2015, p. 12. Translated from Swedish)	RESEARCH AND MEDIA PARENTING STYLES MONOTORING AVOID -UNPREDICTABILITY
For sports associations, the market pressure is correspondingly rooted in perceived demands to run an increasingly professionalised and customer-oriented business. Costs (*p*.8). (Document analysis: Idrottens pris: About the costs of sport and the importance of membership, 2015. Translated from Swedish)	MARKET PRESSURE 'PROFESSIONALISED' CUSTOMER (PARENTS)
The debate took place in a period in Swedish society when neoliberalism emerged for the first time and became a serious ideological challenger to the social democratic welfare policy. The criticism of Roy and Bob was that they played robot football, factory football and it was rubbish football. The players who submitted to the system acted like robots without their own will. They could not express their own talents and they had to run exactly as they were told, like on a conveyor belt. (Document analysis: Svenskafans: Bob and Roy, August 21, 2003. Translated from Swedish)	NEOLIBERLAISM CHALLENGING ENGLISH MODEL 'ROBOT FOOTBALL' PLAY THE COACHES WAY PREDEFINED OUTCOMES COACH CONTROL
… in a form of Darwinian competition, they are emulated and compete with each other as they practice more extensive and increasingly advanced and specialised training (p66). (Document analysis: Riksidrottsforbundet. Elitidrott rapport 2015. Translated from Swedish)	SELECTION/DESELECTION INTERNAL COMPETITION 'SPECIALISED TRAINING'
https://www.youtube.com/watch?v=U9UGWHQX9-c SvFF Technique register video	TECHNIQUE REGISTER THEME EXPLICIT INSTRUCTIONS PREDEFINED PATTERN PREDEFINED OUTCOME COACH CONTROL
SvFF UEFA B Coach education example (see O'Sullivan et al., 2023, p. 11, Figure 3)	THEME PREDEFINED OUTCOMES COACH CONTROL PLAY THE COACHES WAY

not the sole location of data collected, or its realm of influence (see supplementary material AIK ATDE). This is expanded on in the following analytical narrative, where we highlight the extent to which the intentions of coaches and the value-directedness that players experience in training and in games relates to the macrosystems, socio-cultural constraints, and forms of life that can influence responsiveness to affordances.

There is an indication woven through the data that the structure of development pathways and on-field pedagogies at AIK youth football were deeply interconnected, in the sense that development pathways and practice task designs were deeply ingrained in ideas and expectations of limiting unpredictability. This contributed toward the value-directedness that was shaping the intentions of coaches and players at the club, which was expressed in many ways. The description of a *nerve* that influenced pedagogy is indicative of an *anxiety* and *expectation* that cascaded through organisations and structures, amplifying ideas associated with early *selection* and *de-selection*. Within an evolving culture of *status* among parents, this *nerve* emerged in parental behaviour. Here, ideas of *coach control* led to task designs and 'nivåindelning' (*best with best*) that aimed to achieve *results*, which

Table 5. Key themes arising from ethnographic data under the meta theme control over.

Meta theme: Control over context Themes directed towards: Control over context	Related themes
Macro environment: Swedish national culture	
• Lika barn leka bäst • Neoliberalism	
Macro environment: Swedish sport	
• SMTD • Elite investment/professionalisation	• Collaboration v Competition
Macro environment: Swedish football	
• Coach centered pedagogy • Elitism • Parent expectations • English model	• Systems of play • Bernard/Business • Scouts/Agents
Microenvironment: AIK football club	
• Game model/Systems of play • Technique register • Status and performance anxiety • Conform and comply	• Nerve

accompanied an emerging parenting style grounded in a form of *monitoring* to ensure exclusivity with their child not having to encounter too much resistance in their development.

Coaches maintained their *status* through *results* and adopted deterministic methods in training and games, like using *predetermined passing patterns* to *control* future outcomes and limit unpredictability (*predefined outcomes*). Players maintained their *status* by *playing the coaches way* through compliance with *explicit* coach instructions. This approach provided the mirage of *coach control* which appealed to the *expectations* of parents that was associated with *results*. Another way to limit unpredictability regarding early *results* was to have an early *selection* of the *best with the best*, which was becoming a pervasive practice within Swedish youth sport. These controlling tendencies resonated with those from the broader macrosystem levels of the Swedish sports, football and national culture (*professionalisation, commercialisation, early elite, market pressure*), emerging economic interests (*agents/scouts*) even at the macro levels beyond Sweden, framing youth football as an economic interest (*business*).

This, arguably, amplified *expectations* as to what young players learning in development should 'look like'. Indeed, a consequence of this was the reinforcement of the culturally resilient belief that greater stability and consistency in performance is related to practicing repeatable movement patterns, evident in practice task designs that were limiting player engagement. This value-directedness towards limiting unpredictability aligned with a deeply rooted path-dependent coach education form of life. Practices prioritised in Swedish Football Association coach education until 2014 were underpinned by the use of *themes* that foregrounded *predefined patterns*, optimal technique (*technique register*) under *explicit instructions*. These practices highlighted a cultural-historical inheritance (1970s English model) that embodied a *coach control* pedagogy, where the coach had the overall picture of the game that players needed to comply with (*play the coaches way*). The *coach control* system trajectory was still evident in the new coach education courses through *theme* driven game-based designs that were underpinned by the need to limit unpredictability (*predefined outcomes*).

Table 6. Key themes with examples of data relating to the meta theme control over context.

Location	Theme	Codes	Examples
Micro-environment	Game model-systems of play	PREDEFINED OUTCOMES PASSING PATTERNS COACH CONTROL EXPLICIT INSTRUCTIONS PLAY THE COACHES WAY	Looking at the sessions that take place after the 'extra training' with the older youth teams, there are a lot of predetermined passing patterns that are practiced in isolation of opponents and then put into a game. If the players don't play out from the back the exact way the coach wants them to, then the play gets stopped. A lot of decisions were pre-decided – very clear predetermined patterns which we also practiced very hard in training
	Conform and comply	PLAY THE COACHES WAY EXPLICIT INSTRUCTIONS FOCUS PASSING PATTERNS	We are expecting kids to behave like mini-(military) adults. Stand to attention, listen attentively, do what we tell them. If kids do this then the coach is a good. This is often the criteria from which parents judge a coach. Yes, even now when they say to players that we must work with switching the play [theme], players just pass the ball from side to side all the time because this is what the coach thinks that they must do and the players' understanding is limited by the idea that they must switch the play, but they will do it so that it will look right for the coach.
	Status and performance anxiety	NERVE RESULTS STATUS MAINTENANCE COACH CONTROL INTERNAL-COMPETITION BEST WITH BEST	… what performance anxiety looks like coming up to the end of the academy season. They are competing against each other, even when in the same team, instead of collaborating to make each other better. The father wanted a guarantee that his son would play in the academy next year. Years ago, the results were what I leaned on and if we won, we played well, if we lost, we were bad. When I was younger, I didn't want to come in on Monday [to AIK] if we lost on Sunday. I was the one who selected the 8-year-olds to the academy.
	Technique-register	COACH CONTROL EXPLICIT INSTRUCTIONS PASSING PATTERNS ORDER	There are a lot of predetermined passing patterns that are practiced in isolation of opponents and then put into a game Do everything as fast as you can. From the ladder work to the isolated passing drills, to the games. I also keep hearing 'snabba beslut (quick decision)'.
Macro-environment Swedish football	English Model	COACH CONTROL PLAY THE COACHES WAY EXPLICIT INSTRUCTIONS	The criticism of Roy and Bob was that they played robot football, factory football and it was rubbish football. The players who submitted to the system acted like robots without their own will. They could not express their own talents and they had to run exactly as they were told, like on a conveyor belt.
	Elitism	BEST WITH BEST EARLY SELECTION PROFESSIONALISM-COMMERCIALISM SCOUTS AGENTS ANXIETY	It has happened that we have closed national team camps because talent scouts, agents and relatives get involved and the young people have a hard time dealing with it, says Eriksson. Selection and elite efforts have long been creeping down the ages in AIK, Hammarby, Brommapojkarna and Djurgården. They are accused of distorting a 'system' and breaking rules about recruiting children. The argument you most often encounter when you are out in clubs is that 'the others do it'. It shows what a low level the discussion is at. Fear drives the system.

Location	Theme	Codes	Examples
	Parent expectations-status	MONOTORING PREDEFINED OUTCOMES COACH CONTROL STATUS MAINTENANCE	There is an evolving culture of status among parents that have a 'high performing child. In short, it can be said that these parenting styles mean that the children's path forward in life is 'swept' and 'supervised' so that they avoid encountering resistance and problems.
	Coach centered pedagogy	COACH CONTROL TECHNIQUE REGISTER THEME EXPLICIT INSTRUCTIONS PREDEFINED PATTERN PREDEFINED OUTCOME PLAY COACHES WAY	https://www.youtube.com/watch?v=U9UGWHQX9-c
Macro environment Swedish sport	SMTD	SELECTION DESLECTION INTERNAL-COMPETITION ANXIETY	… the pyramid, many individuals make their entry into organised sports. They develop knowledge and skills through a process where, in a form of Darwinian competition, they are emulated and compete with each other as they practice more extensive and increasingly advanced and specialised training. 'They are accused of distorting a 'system' and breaking rules about recruiting children - but they have started to pull in different directions. But also a track that leads straight into Stockholm football, where four big clubs are accused of driving a problematic frenzy, but have started to pull in different directions. It will soon become clear that both cases essentially revolve around one issue more than any other: Selection.'
	Elite-investment/ professionalisation	PROFESSIONALISM-COMMERCIALISM MARKET PRESSURE STATE MONEY ELITE STATUS	'From having been one obstacle, the money instead became an opportunity. While the state primarily promoted professionalisation, the market supported commercialisation.' 'There is no monster that controls access to elite programs. The problem is the football associations cowardice.' Bodström (justice minister) stands behind elite groups for children' 'Part of this has certainly been the professionalization process we have been able to follow in sports since the early 1990s, that is, the dream of becoming a professional in one's sport is not only a child's, but also a parent's.' ' … .on the other hand, competitive spirit, selection and deselection increasingly further down the ages can be explained by the connection to the commercial elite sport.'
Macro environment Swedish culture	Neoliberalism	MARKET PRESSURE PROFESSIONALISATION	The debate (English v Swedish model) took place in a period in Swedish society when neoliberalism emerged for the first time and became a serious ideological challenger to the social democratic welfare policy. For sports associations, the market pressure is correspondingly rooted in perceived demands to run an increasingly professionalised and customer-oriented business.

Location	Theme	Codes	Examples
	Lika barn leka bäst	BEST WITH BEST SELECTION	Lika barn leka bäst - möt Malmös nya anfallsduo © PUBLICERAD: 15 OKTOBER, 2016 https://www.fotbollskanalen.se/video/3572452/lika-barn-leka-bast-mot-malmos-nya-anfallsduo/

First probe and second research cycle

The primary research question was devised to help orient the research in the field and navigate the research context, which led to the emergence of the second research question during data analysis-synthesis. To form a coherent foundation for the club's practice design and education programs, the first probe, 'AIK Base' framework (see O'Sullivan et al., 2023; Woods et al., 2020a) was created to encourage the coordination of shared principles and language. As initial interventions to probe the system were being implemented, the next research cycle (utilising the SIF) sought to capture the evolving socio-material environment as it persisted and changed.

Key findings-second research cycle and second probe

As a practical concept, AIK Base was introduced to guide coaches in designing affordances to support skilled intentionality. A third question evolved during the second research cycle: *what are the 'sticky' socially and culturally constructed values, beliefs and attitudes contributing to a system inertia?*

Here, it was revealed how socio-cultural practices that were anchored to a dominant coaching form of life contributed to a system inertia, meaning that encultured approaches remained – they were 'sticky'. In this context, sticky refers to an ideological inertia, shielding traditionally inherited beliefs about how skill is conceptualised (Renshaw et al., 2022). This stickiness was revealed in the over-constraining of practice tasks through the application of the game model concept in the academy. A game model has been described as an overarching strategic approach considered important for team organisation to enhance player functionality (Ribeiro et al., 2019).

Adopting a form of control over context, coaches were assuming that they could improve affordances by making them more inviting so that players only responded to certain ones. The rigid nature of how a game model was being implemented, however, was limiting problem-solving opportunities, while disregarding the interaction of individual, environmental and task constraints that shape skilled intentions. For example, players that were 'correctly' positioned according to the game model (knowledge *about*) were experiencing problems with their positioning in relation to the pick-up of fast-changing information (knowledge *of*). Data highlighting how a game model amplified player compliance, aligning with a contribution of practices associated with what was culturally understood as professionalism, is presented in Table 7 and elaborated on in the supplementary material.

Table 7. Key themes with examples of data relating to the theme Game model.

Location	Theme	Codes	Examples
Micro-environment	Conform and comply	PLAY THE COACHES WAY PREDEFINED -COACHING POINTS PLANNING MODEL ADMINISTRATION EXPLICIT INSTRUCTIONS PASSING PATTERNS PREDEFINED OUTCOMES CORRECT POSITION-POSITIONING STATUS MAINTENANCE ILLUSION OF -PROFESSIONALISM	We have players filling all the channels [according to the Game Model] when we are in possession, but we still have problems securing control of the ball. We also have problems moving over in defense, we are slow to act. … a coach who kept stopping a session and goes in to show people where they should be positioned and what the player on the ball does … more talk about organisation of the players on the pitch, organisation of planning, organisation of administration, than actual football
Macro environment Swedish football	Coach centered pedagogy	COACH CONTROL THEME PLANNING MODEL EXPLICIT INSTRUCTIONS PREDEFINED PATTERN PREDEFINED OUTCOME PLAY THE COACHES WAY	In other words, they put the coach's role as educator clearly in focus – the coach had the overall picture of how the game should be organised and was solely responsible for teaching this to the players. https://idrottsforum.org/articles/eliasson/eliasson.html
	Systems of play	PASSING PATTERNS PREDEFINED OUTCOME PLAY THE COACHES WAY COACH CONTROL EXPLICIT INSTRUCTIONS	 BP stay with their game model despite seven winless games https://www.aftonbladet.se/sportbladet/fotboll/a/jPk9kb/bp-holl-fast-vid-spelmodellen-trots-sju-segerlosa-matcher The working method describes the team's priorities in the various stages of the game, for example marking or positional defense in the stage of preventing play build-up. The concept is introduced in the game form 7 against 7. Formation indicates the number of players per team. **The team is in formation when the players have taken their starting positions**. The concept is introduced in the game form 7 against 7. Roles are the tasks of the players in the different stages of the game, for example that a midfielder should be higher up the field than the others in the team's play structure. https://utbildning.sisuforlag.se/fotboll/tranare/spelarutbildning/svffs-spelarutbildningsplan/spelet/lagets-spelsystem/
Macro environment Swedish Sport	Profession–alisation	(EARLY)-PROFESSIONALISATION-(ILLUSION OF) ADMINISTRATION COMMERCIALISM MARKET PRESSURE MONEY	The road to a successful sports career is long and tough. Malin Träff, the National Sports Confederation's children and youth manager, compares the most extreme cases of early professionalization to trafficking. - Money, power and success are incredibly strong driving forces for many, including those in and around sports, she tells Swedens Radio. https://www.aftonbladet.se/sportbladet/a/Rr0E7A/riksidrottsforbundet-malin-traff-jamfor-ungdomsidrott-med-trafficking

To combat these encultured 'sticky' approaches, a need to dampen the prioritization of knowledge *about* the environment, while amplifying task designs and coach behaviours that promote the development *of* the environment, was identified. Building on the key ideas of AIK Base, the Contemporary Player Learning in Development Framework was proposed to encourage the design of tasks that were more neutral in terms of outcomes. As part of this framework, the Foundations for Task Design Model, supported by the relational concept of shaping skilled intentions, was suggested to support the design of tasks underpinned by a landscape of affordances offering a wide array of invitations (Withagen et al., 2012).

Conclusion

In an effort to help us *know better*, this paper aimed to exemplify how scientists can undertake data analysis-synthesis when practicing research as an art of inquiry. We proposed that the LDRF facilitates such an appreciation of research, where the scientist is deeply embedded, dwelling within a sports organisation, following along with the unfolding of an ongoing inquiry. Indeed, the very idea of an ongoing-ness highlights the iterative and integrated nature of the LDRF.

We highlighted how a phronetic iterative approach to data analysis-synthesis, an approach that we feel aligns with the proximity of researcher embeddedness our theorising advocates for, can be utilised to ensure that the researcher remains 'in touch' with a phenomenon, situated with-in its field of relations. Central to our endeavour was highlighting a Gibson (1966, 1979) distinction that can guide ways of knowing. More directly, instead of just focusing on data collection or recorded observations documented after the fact, leading to the production of knowledge *about*, a researcher dwelling with-in context can grow knowledge *of* and *with* phenomena to enrich and inform the evolution of practice and performance in real-time.

We offered a case study walk-through to provide insights into how a phronetic iterative approach can support LDRF researchers practicing an art of inquiry. We illustrated how this process highlights an ongoingness of inquiry, where the researcher is encouraged to undertake analysis as soon as possible, follow emergent curiosity, feel comfortable in learning by doing, and as the process unfolds, create guiding research questions (Tracy, 2018; Tracy & Hinrichs, 2017). It is our hope that the type of data analysis and synthesis presented in this paper encourages LDRF researchers to view phenomena as places of entanglement, emphasising the enrichment of a reciprocal and functional relationship between athletes and environments, forming complex, interconnected systems. This way of paying attention to an ecology of relations can support the resolution of the interplay between specific socio-cultural constraints and affordances for skill learning within a form of life. After all, as elegantly put by Woods and Davids (2022, p. 588), to know a phenomenon is to know its story of becoming, joining with its goings on.

Notes

1. Here, we define organism-centredness in line with Davids and Araújo (2010); as a bias towards the 'internal mechanics' of the athlete, neglecting the role of the environment in the explanation of behaviour.
2. What makes it artful, according to these authors, is that the researcher *thinks through doing*, as opposed to the opposite; *doing through thinking*. This means the researcher works with-in the context of their inquiry, in much the same way a potter (for example) works with the constraints of the clay in which they throw.
3. For a detailed overview, see https://www.thoughtco.com/polders-and-dikes-of-the-netherlands-1435535.

Disclosure statement

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References

Adolph, K. (2019). An ecological approach to learning in (not and) development. *Human Development*, *63*(3-4), 180–201. https://doi.org/10.1159/000503823

Araújo, D., Davids, K., & Hristovski, R. (2006). The ecological dynamics of decision making in sport. *Psychology of Sport and Exercise*, *7*(6), 653–676. https://doi.org/10.1016/j.psychsport.2006.07.002

Araújo, D., Fonseca, C., Davids, K., Garganta, J., Volossovitch, A., Brandão, R., & Krebs, R. (2010). The role of ecological constraints on expertise development. *Talent Development & Excellence*, *2*(2), 165–179.

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.2017.1349826.2017.1349826

Bowes, I., & Jones, R. L. (2006). Working at the edge of chaos: understanding coaching as a complex, interpersonal system. *The Sport Psychologist*, *20*(2), 235–245. https://doi.org/10.1123/tsp.20.2.235

Button, C., Seifert, L., Chow, J. Y., Araújo, D., & Davids, K. (2020). *Dynamics of skill acquisition: An ecological dynamics approach*. Human Kinetics.

Davids, K., & Araújo, D. (2010). The concept of 'organismic asymmetry' in sport science. *Journal of Science and Medicine in Sport*, *13*(6), 633–640. https://doi.org/10.1016/j.jsams.2010.05.002

Davids, K., Handford, C., & Williams, M. (1994). The natural physical alternative to cognitive theories of motor behaviour: An invitation for interdisciplinary research in sports science? *Journal of Sports Sciences*, *12*(6), 495–528. https://doi.org/10.1080/02640419408732202

Dowling, M. (2008). Reflexivity. In L. M. Given (Ed.), *The sage encyclopedia of qualitative research methods* (pp. 747–748). Sage Publications.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing ethnographic fieldnotes*. The University of Chicago Press.

Gibson, J. (1979). *The ecological approach to visual perception*. Psychology Press.

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

Henriksen, K. (2010). The ecology of talent development in sport: A multiple case study of successful athletic talent devel- opment environments in Scandinavia [Unpublished doctoral dissertation]. The Faculty of Health Sciences, University of Southern Denmark.

Henriksen, K., & Stambulova, N. (2017). Creating optimal environments for talent development: A holistic ecological approach. In J. Baker, S. Cobley, J. Schorer, & N. Wattie (Eds.), *Routledge handbook of talent identification and development in sport* (pp. 271–284). Routledge. Routledge International Handbooks. https://doi.org/10.4324/9781315668017-19

Hodges, B. H., & Baron, R. M. (1992). Values as constraints on affordances: Perceiving and acting properly. *Journal for the Theory of Social Behaviour*, *22*(3), 263–294. https://doi.org/10.1111/j.1468-5914.1992.tb00220.x

Ingold, T. (2011). *Being alive: Essays on movement, knowledge and description*. Routledge.

Ingold, T. (2013). *Making: Anthropology, archaeology, art and architecture*. Routledge.

Juarrero, A. (1999). *Dynamics in action: Intentional behavior as a complex system*. MIT Press.

Juarrero, A. (2023). *Context changes everything: How constraints create coherence*. MIT Press.

Kiely, J. (2018). Periodization theory: Confronting an inconvenient truth. *Sports Medicine*, *48*(4), 753–764. https://doi.org/10.1007/s40279-017-0823-y

Kirkland, A., & O'Sullivan, M. (2018). There is no such thing as an international elite under-9 soccer player. *Journal of Sports Science & Medicine*, *17*(4), 686–688.

Lecompte, M. D., & Schensul, J. J. (1999). *Designing & conducting ethnographic research*. AltaMira Press.

Lester, J. N., & Anders, A. D. (2018). Engaging ethics in postcritical ethnography: Troubling transparency, trustworthiness, and advocacy. *Forum Qualitative Social Research*, *19*(3), https://doi.org/10.17169/fqs-19.3.3060

Messner, M. A., & Musto, M.. (2016). *Child's play: Sport in kids' worlds*. Rutgers University Press.

Moeran, B. (2007). From participant observation to observant participation. In S. Ybema, D. Yanow, H. Wels, & F. Kamsteeg (Eds.), *Organizational ethnography: Studying the complexities of everyday life* (pp. 139–156). Sage Publications.

Montuori, A. (2011). Beyond postnormal times: The future of creativity and the creativity of the future. *Futures*, *43*(2), 221–227. https://doi.org/10.1016/j.futures.2010.10.013

Nelson, G., Ochocka, J., Griffin, K., & Lord, J. (1998). "Nothing about Me, without Me": participatory action research with self-help/mutual aid organizations for psychiatric consumer/survivors. *American Journal of Community Psychology*, *26*(6), 881–912. https://doi.org/10.1023/A:1022298129812

Newell, K. M. (1986). Constraints on the development of coordination. In M. G. Wade, & H. T. A. Whiting (Eds.), *Motor development in children: Aspects of coordination and control* (pp. 341–360). Martinus Nijhoff Publishers.

O'Sullivan, M., Vaughan, J., Rumbold, J., & Davids, K. (2021). The learning in development research framework for sports organizations. *Sport, Education & Society*.

O'Sullivan, M., Vaughan, J., Rumbold, J. L., & Davids, K. (2023). Utilising the learning in development research framework in a professional youth football club. *Frontiers in Sports and Active Living*, *5*, 1169531. https://doi.org/10.3389/fspor.2023.1169531

Reed, E S. (1996). *Encountering the world: Toward an ecological psychology*. Oxford University Press.

Renshaw, I., Davids, K., Newcombe, D., & Roberts, W. M. (2019). *The constraints-led approach: Principles for sports coaching and practice design*. Routledge.

Renshaw, I., Davids, K., & O'Sullivan, M. (2022). Learning and performing: What can theory offer high performance sports practitioners? *Brazilian Journal of Motor Behavior*, *16*(2), 162–178. https://doi.org/10.20338/bjmb.v16i2.280

Ribeiro, J., Davids, K., Araújo, D., Guilherme, J., Silva, P., & Garganta, J. (2019). Exploiting bi-directional self-organizing tendencies in team sports: The role of the game model and tactical principles of play. *Frontiers in Psychology*, *10*, 2213. https://doi.org/10.3389/fpsyg.2019.02213

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

Rothwell, M., Davids, K., & Stone, J. (2018). Harnessing socio-cultural constraints on athlete development to create a form of life. *Journal of Expertise*, *1*(1), 94–102.

Snowden, D., & Boone, M. (2007). A leader's framework for decision making. *Harvard Business Review*, *85*, 68–76.

Sullivan, M. O., Woods, C. T., Vaughan, J., & Davids, K. (2021). Towards a contemporary player learning in development framework for sports practitioners. *International Journal of Sports Science & Coaching*, https://doi.org/10.1177/17479541211002335

Tracy, S. J. (2010). Qualitative Quality: Eight "Big-Tent" criteria for excellent qualitative research. *Qualitative Inquiry*, *16*(10), 837–851. https://doi.org/10.1177/1077800410383121

Tracy, S. J. (2018). A phronetic iterative approach to data analysis in qualitative research. *Journal of Qualitative Research*, *19*(2), 61–76.

Tracy, S. J., & Hinrichs, M. M. (2017). Phronetic iterative data analysis. In J. Mattes, C. S. Davis, & R. F. Potter (Eds.), *The international encyclopedia of communication research methods* (pp. 1–8). John Wiley& Sons.

Uehara, L., Button, C., Araújo, D., Renshaw, I., Davids, K., & Falcous, M. (2018). The role of informal, unstructured practice in developing football expertise: The case of Brazilian pelada. *Journal of Expertise*, *1*(3), 162–180.

Uehara, L., Button, C., Falcous, M., & Davids, K. (2014). Contextualised skill acquisition research: A new framework to study the development of sport expertise. *Physical Education and Sport Pedagogy*, *21*(2), 153–168. https://doi.org/10.1080/17408989.2014.924495

van Dijk, L., & Rietveld, E. (2017). Foregrounding sociomaterial practice in our understanding of affordances: The skilled intentionality framework. *Frontiers in Psychology*, *7*, 1969. 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*, *10*, 2090. https://doi.org/10.3389/fpsyg.2019.02090

Vaughan, J., Mallett, C. J., Potrac, P., Woods, C., O'Sullivan, M., & Davids, K. (2022). Social and cultural constraints on football player development in Stockholm: Influencing skill, learning, and wellbeing. *Frontiers in Sports and Active Living*, *4*, 832111. https://doi.org/10.3389/fspor.2022.832111

Vaughan, J., Mallett, C. J., Potrac, P. A., López-Felip, M. A., & Davids, K. (2021). Football, culture, skill development and sport coaching: Extending ecological approaches in athlete development using the skilled intentionality framework. *Frontiers in Psychology*, *12*, 635420. https://doi.org/10.3389/fpsyg.2021.635420

Wilkinson, C. (2017). Going 'backstage': observant participation in research with young people. *Children's Geographies*, *15*(5), 614–620. https://doi.org/10.1080/14733285.2017.1290924

Winner, D. (2001). *Brilliant orange*. Bloomsbury.

Withagen, R., Poel, H. J., Araújo, D., & Pepping, G. (2012). Affordances can invite behavior: 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

Wittgenstein, L. (1953). *Philosophical investigations*.

Woods, C. T., Araújo, D., & Davids, K. (2022). Joining with the conversation: research as a sustainable practice in the sport sciences. *Sports Medicine – Open*, *8*(1), 102. https://doi.org/10.1186/s40798-022-00493-0

Woods, C. T., & Davids, K. (2021). "You look at an ocean; I see the rips, hear the waves, and feel the currents": dwelling and the growth of enskiled inhabitant knowledge. *Ecological Psychology*, *33*(3–4), 279–296. https://doi.org/10.1080/10407413.2021.1965481

Woods, C. T., & Davids, K. (2022). Thinking through making and doing: sport science as an art of inquiry. *Sport, Education and Society*, *28*(5), 579–593. https://doi.org/10.1080/13573322.2022.2054792

Woods, C. T., McKeown, I., O'Sullivan, M., Robertson, S., & Davids, K. (2020a). Theory to practice: Performance preparation models in contemporary high-level sport guided by an ecological dynamics framework. *Sports Medicine – Open*, *6*(1), 36. https://doi.org/10.1186/s40798-020-00268-5

Woods, C. T., Rudd, J., Araújo, D., Vaughan, J., & Davids, K. (2021). Weaving lines of inquiry: Promoting transdisciplinarity as a distinctive way of undertaking sport science research. *Sports Medicine – Open*, *7*(1), 55. https://doi.org/10.1186/s40798-021-00347-1

Woods, C. T., Rudd, J., Robertson, S., & Davids, K. (2020b). Wayfinding: How ecological perspectives of navigating dynamic environments can enrich our understanding of the learner and the learning process in sport. *Sports Medicine – Open*, *6*(51), 1–11. https://doi.org/10.1186/s40798-020-00280-9