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The Role of Skill Acquisition Specialists Within Sports—Why Every High-performance Sports Organization Needs These Experts!

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Abstract
Across high-performance sports, a growing number of specialized expert practitioners within team staffs is becoming the norm, and the emergence of "skill acquisition specialists" (SAS) has been noted over recent years. While these SAS aim to support teams and coaches in designing and facilitating effective practice and performance environments for individual athletes, there are additional opportunities that would positively affect high-performance sports organizations and build bridges between departments. Hence, by elaborating on the role of SAS with the potential benefits, responsibilities, collaboration opportunities, and a formal job description, this position paper aims to merge contemporary theory based on an ecological dynamics rationale with a "pracademic" perspective on athlete development and performance preparation. We make several arguments for why every high-performance sports organization needs SAS support and aim for key decision-makers in sports to understand the benefits of SAS. Constantly highlighting an athlete-environment-centered perspective on coaching, several concepts such as constraints, representative learning design, affordances, alive movement problems, and dexterity are brought to life by expanding on the SAS role in detail and providing examples for practical application of the role in high-performance sport coaching.

Keywords
skill acquisition specialist, skill adaptation, coaching, ecological dynamics, pracademic, soccer, American football

Introduction
A few years ago, one of soccer's most successful managers, former Liverpool FC's Jürgen Klopp, made this statement about his coaching staff and the value of specialists within it: "You cannot have enough specialists around you. I must always be the guy who makes the decisions on when we use all these specialists, but you cannot have enough" (Shaw, 2018). Klopp was explaining his decision to hire a "throw-in coach," which at the time was a curiosity (Smith, 2018).

Current examples of specialist coaches that are employed and integrated at all levels of high-performance sports organizations include, but are not limited to, quarterback coaches in American football, goalkeeping coaches in soccer, shooting coaches in basketball, and pitching coaches in baseball. Moreover, organizational staffing structures now include psychologists, nutritionists, performance analysts, and transition coaches who help players bridge the gap between academy- and

senior-level teams in sports such as soccer (see Otte, Davids, et al., 2020; Otte et al., 2022).

While increasing the number of specialized expert practitioners within team staffs is becoming the norm across high-performance sports, contemporary skill acquisition theory, based on an ecological dynamics rationale, simultaneously aims to provide an evidence-based theoretical foundation for effective practices and staff integration (Rothwell et al., 2020). Here, the emergence of "skill acquisition specialist" roles has been noted over recent years and will be targeted in this position paper. Broadly defined by Steel and colleagues (2014, p. 367) as "sport scientists who examine the theories, principles, and processes of motor and perceptual learning", these skill acquisition specialists (SAS) aim to support teams and coaches in designing and facilitating effective learning and performance environments. Yet, even with this recent emphasis on such positions, there remain fewer roles for SAS than other specialist positions or support roles in high-performance sports (Müller et al., 2020; Williams & Hodges, 2023). Though some sporting organizations have recognized the need and value of having SAS embedded in their environments (although more common in Australia; Pinder et al., 2020), the role has not been common worldwide, including in American professional sports (Shawn Myszka, 2023a), despite the ongoing desire to optimize athletic preparation through comprehensive and integrated athlete-support services in high-performance departments (DeWeese et al., 2023). Presumably, this could be due to inaccurate perceptions of what constitutes a SAS and how this potential role could help facilitate change (Williams & Hodges, 2023).

Put simply, based on contemporary knowledge about athlete learning, development, and performance preparation, the aim of the applied SAS is to boost the potential of athletes and teams to help them achieve substantial gains in their skill enhancement and prepare for maximum performance returns (Otte et al., 2019; Yearby et al., 2022; Shawn Myszka, 2023a). The term "skill" for this paper (and possibly contrary to common use for some in sports) does not merely consider technical movements (e.g., a shooting or movement technique) but rather concerns the integrated roles of cognition, perception, and action, with further emphasis on athletes' constant interactions and functional relationships (i.e., effective problem-solving) within their environments (Myszka et al., 2023a). Importantly, ecological dynamics not only highlights individuals at the center of the learning process; it also stresses the inseparable and intertwined link between these individuals and their surrounding environments. Constrained by the properties of each individual, the environment, and the task at hand, this ecological understanding of athlete learning and skill adaptation warrants great insight that "pracademic" SAS may be at the forefront of.

While positional coaches could share some degree of knowledge and expertise with SAS (e.g., regarding topics like skill execution, training periodization, methodology, and coaching approaches), the roles of the SAS do not necessarily have to align fully with those of sport-specific coaches. Furthermore, most coaches will likely not possess the same depth of knowledge and understanding pertaining to ideas relevant to skillful movement behavior and creating optimal conditions for learning that the SAS does. In other words, there is much more to the SAS role than providing position-specific coaching for individual athletes, even though that is highly relevant (Shawn Myszka, 2023b). Given that the SAS may link various departments under the umbrella of shared theoretical principles for practice design, individualized athlete development, and performance (see later sections on responsibilities, partnerships and collaborations), the role of the SAS may provide fruitful advantages for sports organizations that this paper aims to outline. Finally, to practically demonstrate the value and novelty of the SAS role and clear up some of the potential misunderstandings of the position (Pinder et al., 2020; Williams & Hodges, 2023), we provide a SAS job description and summary, concluding with a brief practical application of the role into

high-performance sports coaching. This adds to the empirical evidence (Müller et al., 2020; Pinder et al., 2020; Williams & Hodges, 2023) highlighting how SAS can affect high-performance sports preparation while making several arguments for how the SAS can build bridges between departments and why every sports organization actually needs SAS support. We aim for key decision-makers in sports to understand the benefits of SAS, to develop trust in their expertise, and for coaches to see the supportive value of SAS, who in many cases are "pracademics" by having practical coaching experience combined with advanced academic degrees.

Aims of This Paper and Key Messages on the Roles of SAS

To support an understanding of the roles of SAS for decision-makers in sports (e.g., head coaches, athletic directors, and general managers of sports organizations), the authors will outline and discuss several key messages early on. In our view, the benefits of adding and engaging these SAS are multifaceted, providing value on various levels for any high-performance sports organization:

- SAS may assist head coaches and the entire coaching staff in co-creating more effective training designs that maximize chances for learning to transfer from practice to competition and, further, allow athletes to reach their personal career goals, developmental and performance targets and, at the same time, enjoy the journey of finding their own ways of solving complex sport-specific problems.
- SAS may support organizations in increasing player and team performances by helping athletes become more skilled and adaptable to changing performance environments through the application of contemporary skill acquisition principles. We argue that athletes become more advanced in coordinating integrated movement solutions (IMS), underpinned by intertwined processes of perception-cognition-action, thus leading to more adept problem solvers in sports (Myszka et al., 2023a, 2023b). Hence, an ecological dynamics approach goes deeper than mere sport-specific tactical or technical frameworks by considering the athlete as a complex adaptive system in constant interaction with their environment.
- SAS, with a holistic perspective on athlete development and performance, provide opportunities to build bridges across departments within an organization. SAS play a fundamental role in driving the workings of a *Department of Methodology* (referred to as a High-Performance Department in some countries) with shared development and coaching principles, circumventing problems of departments working in isolation, communication barriers, and disconnected practice approaches (see Rothwell et al., 2020, for an introduction of the notion of a Department of Methodology).
- Last but not least, it must be stated that for sport-specific positional coaches, instead of possibly viewing SAS as a threat, these specialists should be regarded as a type of "coaching consultant" that aims to support coaches in facilitating individualized athlete development principles and processes, the creation of effective training and practice designs, and overall organizational communication. The SAS would elaborate on the understanding of skills guided by an ecological dynamics approach, facilitating more effective and efficient ways of working across departments within high-performance sports organizations.

Before continuing with the applied functions of SAS within sports, we provide a brief theoretical background on ecological dynamics, bringing more clarity to the contemporary skill acquisition framework that underpins the work of a SAS.

A Brief Theoretical Background on Ecological Dynamics

Ecological dynamics is a transdisciplinary framework for understanding skill, performance,

and development (Araújo et al., 2006; Woods et al., 2021), which combines ideas from ecological psychology (Gibson, 1979), constraints on dynamical systems (Newell, 1986), the complexity sciences (Edelman & Gally, 2001), and other contemporary scientific domains (e.g., evolutionary biology). Key concepts were initially conceptualized for sport scientists and practitioners in the works of Davids et al. (1994), Handford et al. (1997), and Araújo et al. (2006), who proposed an embedded role for cognition, perception, and action. Accordingly, departments within any sports organization should not be looking for performance in its "isolated" components since performance is not solely within such parts. Put simply, from an ecological dynamics perspective, athletes' performances cannot (and should not) be decomposed into simple tactical, technical, physical, or psychological components, as it is athletes' holistic interactions with the performance context that facilitate and drive these performances.

To help athletes find an evolving fit with the dynamic environments they inhabit, SAS must have a deep understanding of (1) *constraints* (Newell, 1986) and how they can be manipulated purposefully to help athletes adapt their skills (i.e., using the constraints-led approach; CLA); (2) *representative learning design* (Pinder et al., 2011) that simulates information found in performance environments, offering athletes a chance to couple their movement to relevant information sources, which could lead to increased transfer; (3) *affordances* (i.e., opportunities for action; Gibson, 1979), which are specified by information; and (4) the importance of athletes exploring *alive movement problems* (i.e., ever-changing and replete with opportunities for interaction; Yearby et al., 2022, 2024; Myszka et al., 2023a, 2023b).

According to Newell's (1986) conceptualization, *constraint categories* highlight task, environmental, and individual features or characteristics that interact together to shape, guide, or channel the coordination of behavior in complex systems. In sports, for example, the time remaining on the shot clock in basketball will affect both offensive and defensive play. Alternatively, windy or snowy conditions in American football may invite more running plays and fewer passing plays. Moreover, in mixed martial arts, a fighter who has taken numerous strikes to the face, resulting in swelling and affecting their eyesight, may switch to a different stance (e.g., southpaw versus orthodox), positioning them to see their opponent better. It is critical to understand that constraints, acting as informational boundaries or features, are not causing actions; instead, some actions are either channeled or excluded by them (Newell, 1986; Gray, 2021).

Identifying such constraints allows for the creation of *representative practice activities and learning designs* where information and the specified action opportunities are similar to those found in competition, resulting in the emergence of game-like movement behaviors. It should be noted that action invitations (affordances; Gibson, 1979) perceived in decontextualized drills, such as a soccer player dribbling through cones, differ from those perceived when attempting to dribble the ball while being pressured by one or more defenders looking to win possession. Similarly, a defensive lineman in American football presents different affordances for the opposing offensive player than a static dummy. This is critical to understand because individual movement behavior is guided by the *perception of affordances*, which specify possibilities to act according to the characteristics of the individual and the contextual environment (Fajen et al., 2009). In an ecological approach, an athlete's contact with relevant information in the environment is of tremendous significance, as it is from this that the behavior will be organized (Wilson, 2018). Therefore, athletes need to be embedded in practice or training environments where affordances are similar to those emerging within competition. While this may seem daunting for coaches, this is where the inclusion of SAS, informed by the concepts of ecological dynamics, offers possibilities for collaborative work. For example, a shooting coach in basketball and SAS could collaborate on analyzing game sequences and data to identify

affordances and subsequently design practice environments for athletes to enhance the perception of these affordances, with the potential to give rise to functional behaviors during competition. Furthermore, affordances have clear implications when discussing, analyzing, and facilitating movement problem-solving for athletes in sports, as they can be conceptualized as linking the athlete and the environment (Button et al., 2020; Myszka et al., 2023a).

Moreover, another pivotal role of SAS would be to ensure that athletes are presented with *alive movement problems of* varying complexity, requiring them to continuously coordinate movement system degrees of freedom (i.e., perception-cognition-action[1]) across different sport-specific contexts. In other words, by interacting with and attempting to solve diverse and complex movement problems, whether it be during strength and conditioning (S&C) activities (e.g., warm-ups/movement preparation, agility sessions) or during team practice sessions, athletes are challenged to continually adapt their skills (Araújo & Davids, 2011). This approach arguably leads to greater transfer likelihood of skillful performance from training to when it counts on game day in competition.

The ideas above offer a glimpse into the critical background needed by SAS in skill acquisition, sports pedagogy, and other scientific disciplines. To move further into the applied workings of SAS in high-performance sports, we now provide a potential job summary and description, as well as two unique and practical case examples from professional European soccer and American football.

Summary and Potential Job Description for SAS

The SAS is responsible for assessing and supporting the design of practice environments where learning, skill evolution, and performance are maximized. By understanding and applying contemporary skill acquisition theory (i.e., an ecological dynamics approach) to coaching and training practices, SAS will partner with various organizational departments to promote a transdisciplinary athletic development approach. Particularly, a priority and emphasis are to be placed on the SAS assisting in the setting of variable problems for athletes to solve in training and practice in an attempt to facilitate movement skills that transfer across the situations and conditions present within the specific sport (Shawn Myszka, 2023b).

Notably, the following sections and Figure 1 (next page) aim to provide a holistic overview of various partnership areas (see bottom square in Figure 1), guiding objectives (see top-left, black square in Figure 1), and responsibilities (see top-right, red square in Figure 1) that SAS could tap into. Thus, we are mindful not to create the impression that SAS joining an organization must automatically cover all proposed responsibilities and tasks outlined here. Instead, based on organizational demands and contexts, certain working areas for SAS could be prioritized and become the main job focus. Being that the role of a SAS is still in its relative infancy, a great degree of evolution is likely to unfold as more individuals find themselves within these positions and collectively begin to realize where and how their influence can be greatest, similar to other position distinctions across the field (e.g., S&C coaches, sports scientists).

Desirable Qualifications and Expertise

1. Strong foundation in kinesiology and sport coaching with an interest or specialty in motor control, skill acquisition, and sports pedagogy
2. Proven experience designing learning environments for or alongside high-level athletes and coaches
3. Deep understanding of contemporary scientific research related specifically to skill acquisition principles
4. Ability to develop strong relationships with members across all levels of the sporting organization — someone who opens lines of communication and inquiry
5. Detailed knowledge of the sport (preferred); a working knowledge of the sport (required)

Education

Ideally, SAS would have a degree in kinesiology, exercise science, motor learning, or another movement science-related area.

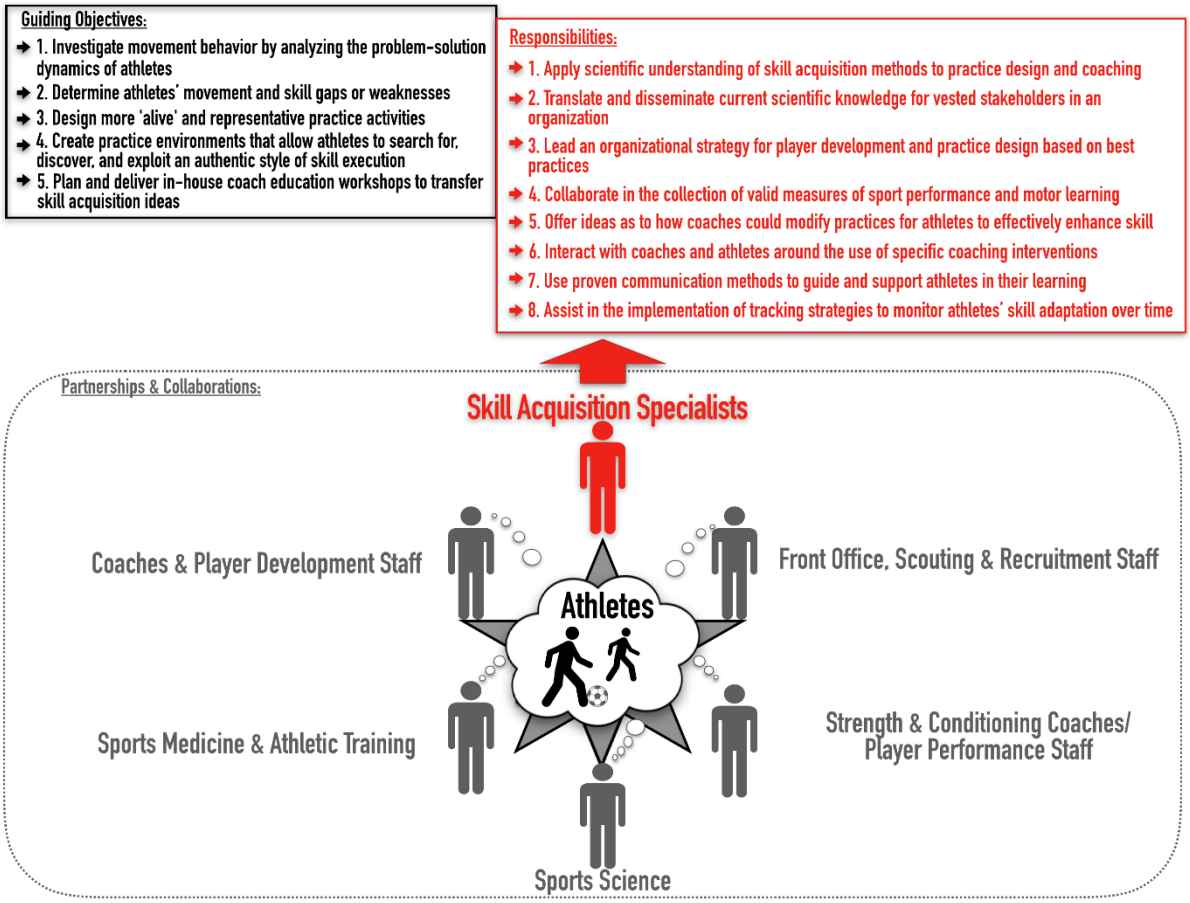

Figure 1. Summary of the Skill Acquisition Specialist (SAS) role, including (1) its various interdependent and mutual partnerships and collaborations within a high-performance sport organization (see bottom square); (2) guiding objectives for the SAS role (see top-left, black square); and (3) role responsibilities for SAS (see top-right, red square).

Guiding Objectives

1. Investigate movement behavior by analyzing the relationships formed between the problems athletes face in competition and the solutions they coordinate to meet these challenges.
2. Determine movement and skill execution gaps or weaknesses that represent opportunities for evolution of athletes' skill sets.
3. Design more "alive" and representative practice activities that adequately stretch athletes to their individualized challenge points.
4. Create a practice environment that allows athletes to search for, discover, and exploit an authentic style of skill execution that separates them from others in their position.
5. Plan and deliver in-house coaching education workshops, transferring empirical understanding of skill acquisition/motor learning to experiential coaching and training practices, including training methodology, periodization, practice activity design, staff integration, and coaching approaches and interventions.

Responsibilities

1. Partner with various organization members to apply the scientific understanding of contemporary skill acquisition methods to practice design and coaching.
2. Provide and maintain current scientific knowledge pertaining to movement behavior and skill acquisition while effectively translating and disseminating that information to all vested stakeholders across the organizational structure of the team (e.g., via reports, newsletters, or in-house workshops).

3. Lead an organizational strategy for individualized player development and practice design based on best practices in movement behavior and skill acquisition.
4. Collaborate with fellow staff, including individuals in Player Performance and Sports Science, in the collection of valid measures of sports performance and motor learning, in line with athletes' specific skill development needs, to help inform cross-departmental initiatives in player development.
5. Offer ideas and suggestions as to how coaches could modify the practice structure to prepare athletes to behave more effectively under the inherent constraints of the game environment (e.g., pressure, anxiety, complexity, fatigue, and chaos).
6. Interact with both coaches and athletes around the use of coaching interventions and, specifically, the use of practice/game film, focusing on how the player is currently solving movement problems in competition (e.g., the information variables they're detecting about an opponent's/ teammate's behaviors, how they're attempting to act) and how they may be able to further alter their movement strategies, overcome pertinent challenges, and/or accept other opportunities for acting in abundant and adaptable fashions.
7. Use proven communication methods (e.g., instructional cueing, augmented feedback, and questioning) to adequately guide and assist athletes on their learning journey.
8. Assist in the implementation of tracking strategies to monitor athletes' skill adaptation and learning over time, ensuring that implemented practice methods are transferred to the competitive sports environment.

Partnerships and Collaborations Within the Organization

SAS could operate as part of a transdisciplinary team, attempting to integrate efforts in the areas of skill acquisition, performance analysis, biomechanics, and athletic development and preparation. The SAS would partner with the following:

1. **Coaching and Player Development Staff** to enhance the practical application of contemporary skill acquisition ideas and methods, such as position-specific practice activity design and problem-setting during individual periods and other periods of practice, and the use of guidance and communication methods (e.g., instructions, feedback) that can more effectively channel authentic skill execution for athletes.
2. **Strength & Conditioning and Player Performance** to adequately assess the movement/skill weaknesses of individual athletes and incorporate relevant training methods that are personalized to the player's needs. This would be accomplished by utilizing contemporary skill acquisition ideas (e.g., repetition without repetition and representative task design for the enhancement of agility movement skills).
3. **Sports Medicine and Athletic Training** to design activities that "bridge the gap" in the return-to-play/return-to-performance process to allow a more seamless transition from rehabilitation efforts to the player being adequately prepared to perform in practice and game environments.
4. **Sports Science** to investigate athletes' movement and skill execution within the competitive and practice environments in more holistic fashions to bring a practical and useful scope of analysis that prioritizes the movement problem-solving processes of athletes (i.e., perception, cognition, action) and the adaptive nature of their movements in interaction with the complex and dynamic problems of the environment.
5. **Front Office, Scouting, and Recruitment Staff** to identify and assess talent using a problem-solver paradigm, assessing the nature of athletes' movement and skill tendencies, and paying close attention to gaps and weaknesses that represent opportunities for growth and potential development.

6. **Athletes** (arguably the most important collaboration partner!) to co-design skill execution and acquisition efforts in alignment with who they want to be and how they uniquely perceive and act, hoping to drive increased engagement and ownership in their personal skill development process.

Practical Application of the SAS Role into High-Performance Sport Coaching

In high-performance sports, coaches commonly display detailed experiential knowledge (e.g., knowledge about tactical-technical playing demands and training). To further advance *player development* and *learning environment designs* in numerous areas, we argue for further coaching integration with the "pracademic" work of SAS, guided by an ecological approach towards athlete learning. Importantly, one possibly misleading idea must be briefly elaborated here: by advocating the SAS role, we do not simply propose a mere increase in the coach-athlete ratio for enhanced individualized athlete development within sports organizations. Rather, by advocating the SAS role, we draw attention to a specialized role for "pracademic" professionals with a unique set of theoretical, empirical, and experiential knowledge about (and of) coaching and athlete development (see Otte et al., 2024). As previously outlined, these SAS view sport performance and skill learning through an integrated lens that considers a wide set of athlete-environment interactions and transdisciplinary contexts that drive and facilitate development and performance at the same time (Otte et al., 2024). In turn, SAS may help weave various areas and individuals together—athletes, coaches, and front offices—to implement a cohesive and all-around athlete development strategy.

To elaborate on the practical integration of SAS with elite coaches in high-performance sport organizations, we would like to provide two brief examples from professional European soccer and American football (NFL) coaching.

Example #1: An integrated approach towards systematic individual player development planning (IDP) in professional European soccer

One current trend in professional European soccer sees clubs investing more resources into position-specific recruitment and individualized player development (e.g., Otte et al., 2019; Austin, 2023). Specialist coaching positions, such as goalkeeping coaches, striker coaches, or individual development coaches, aim to support a single player's skill learning and preparation for performance. Here, coaches and SAS could complement one another to holistically integrate (and not isolate!) physical, tactical, and technical player development. Skill training methodologies and learning principles may be viewed as highly beneficial and, hence, could go beyond mere soccer-specific technical training. In turn, by using an *individual player development planning* (IDP) approach[2], players, (specialist) soccer coaches, SAS, and other support staff may collaborate on identifying areas/gaps of opportunity for players' individual skill development across domains. A next step could then drive the systematic (pre-)planning and periodization of individualized training designs and coaching interventions to explore these areas/gaps (see Otte et al., 2019). A well-integrated IDP process repeatedly highlights one notion about the workings of and collaboration with SAS in high-performance sports: SAS can fulfill different roles within an organization and within this process of supporting individualized player development. This is consistently under the guidance and application of an underlying ecological dynamics rationale, which highlights the deeply entwined athlete-environment relationships and goes beyond mere practice design or coaching processes. For example, within this systematic IDP process in soccer (or any other sport), SAS roles can range from (1), either being a superordinate guide that moderates discussions and drives the process (e.g., by facilitating a formalized process towards identifying and summarizing ideas on how to enhance players' strengths in the game, while also pointing towards potential areas for improvement); to (2), being an active

performance analyst, capturing performance and game data to support IDP development (e.g., measuring and evaluating physical movement and soccer-specific performance data); to (3), being a coach-supporter and assistant, co-creating IDP-based training designs that maximize chances for learning transfer and performance preparation (e.g., emphasizing key tenets of representative learning design and the mutual relationship between development and performance; Otte et al., 2024); or to (4), merely being a connector, facilitating communication between players, coaches, and support staff, such as strength and rehabilitation coaches, psychologists, data analysts or sport scientists, and video analysts. Particularly, the holistic, "pracademic" athlete development perspective of SAS can provide opportunities to build transdisciplinary bridges across departments within an organization. By taking a guiding or directing role, asking insight-driven questions, and establishing theory-supported player development processes and principles (e.g., "repetition without repetition" as an overarching training principle for all training designs; Bernstein, 1967), SAS can provoke transdisciplinary exchange and discussions between departments, circumventing the risks of silo working (see Otte, Rothwell, et al., 2020; Otte et al., 2022).

Example #2: SAS partnering with sport coaches to optimize practice conditions

Though a true SAS role does not yet exist within an American football organization at any level, two authors of this paper have previously consulted with several NFL teams. The example offered here provides an overview of one of their experiences, focusing specifically on how they acted as a SAS in partnering with the running backs (RB) coach during training camp prior to the season. Though the way this role was structured presented certain challenges and had its share of limitations, it could be a proof of concept for what could happen if a team employs a SAS in a more integral role.

Qualitative Assessment of the Existing Practice Environment

After attending team practices during NFL training camp, the SAS found an overreliance placed on the accumulation of repetitions, often performed by rote in highly isolated (i.e., unopposed) or decontextualized fashions, in hopes of "perfecting" the movement execution of players come game day. The training of RB for this particular team, including the instructions used by coaches, aligned with more traditional, linear-based approaches to skill acquisition and included the following:

- "Everyday drills" (EDDs) were executed in an attempt to "master the fundamentals" of the position.
- Technical nuances were taught as "rules" with the expectation of players displaying similar patterns with little room for creativity or authenticity.
- Training equipment like cones, bags, ladders, chutes, trash cans, slalom poles, and stationary dummies were used to signify when, where, or how players should move.
- Players waited in line to take their turn at completing drills (Note: if they were participating in the drill, acting as an opponent or teammate, they often behaved in highly passive, unrealistic fashions).
- There were limited modifications to the learning activities to meet the specific needs of individual players in the group.
- Frequent and continuous delivery of instruction and feedback was provided by the coaching staff to the player(s), often including the "exact" movement that needed to be executed.

Ultimately, the SAS felt that this type of practice approach could potentially limit the ability of players to solve alive problems that were more representative of the competitive performance context that will require them to continuously (re)organize movement system degrees of freedom in relation to emerging opportunities and challenges (Yearby et al., 2022; Myszka et al., 2023a). To assist the SAS in the assessment process of the activities that were utilized in the practices, as well as enhance communication with the coaches around it, the SAS utilized a checklist containing a series of pertinent questions (e.g., Does the movement

problem presented to the athlete in practice contain relevant sources of information for the athlete to regulate their movements?) to ask about the unfolding problem-solution dynamics of each practice task (see Myszka et al., 2023a for further elaboration).

Practical Changes with the Assistance of SAS

As discussed earlier, players must be embedded within movement problems, where there are numerous opportunities for interaction (i.e., affordances). Through analyzing game film from the previous season and observing training camp practice activities in person, the SAS was able to identify areas for improvement in practice, which allowed for alive movement problems to be more effectively set for players, helping them deepen their ongoing relationship with the environment (Fajen et al., 2009). Specifically, at the end of each practice day during training camp, the SAS met with the RB coach to discuss their observations and offer suggestions as to what could be changed in the design of the practice activities. The focus of the discussions was on why each modification was being offered as a way forward while also expanding on how constraints could further be manipulated based on the strengths and weaknesses of each player (i.e., to scale complexity to meet individual needs).

To assist coaches in designing (or setting up) alive movement problems, it is helpful to consider using *slices of the game*, which are activities that are representative of the sport and are designed with varying complexity for specific purposes based on individual and team needs (see Yearby et al., 2022 for two examples). Here, athletes become sensitive to pertinent information sources such as the posture of immediate opponents, relative velocity, and interpersonal distance (Passos et al., 2011; Esteves et al., 2011; Myszka et al., 2023a), which will specify affordances to assist in functional problem-solving within game situations. Furthermore, in the pursuit of skillful movement behavior (Bernstein, 1996; Myszka et al., 2023a), coaches need to consider the notion of "repetition without repetition" (Bernstein, 1967), where increased variability through manipulating situations (e.g., task constraint manipulations; down and distance, workspace size, player starting positions) and conditions (e.g., practicing in inclement weather and having athletes play with varying fatigue levels) can assist athletes in the pursuit of dexterity (Bernstein, 1996).

Armed with these aforementioned ecological dynamics concepts, the SAS partnered with the team's position coaches and others in the organization (e.g., S&C coaches and sports scientists) to purposefully inject enhanced aliveness and variability into practice in an attempt to stretch players to their individualized challenge point and test the adaptability of their movement skills. By offering players opportunities to *repeat the process of solving problems* (Bernstein, 1967), they would begin to adjust the degrees of freedom across their movement system (i.e., perception-cognition-action) to find functional fits for the peculiar movement problem in front of them (Myszka et al., 2023a). Over time, they could become more attuned and adaptable, increasingly capable of tightly coupling their movement directly to the most relevant information sources and the specified affordances emerging from the interactions. Moreover, this includes those related to shared affordances (Silva et al., 2013), due to the presence of teammates in the activities.

Concluding Remarks

The aim of this position paper is clear and simple: to introduce the role of *skill acquisition specialists* (SAS) in high-performance sports and offer an argument for why every high-performance sports organization needs these experts. By elaborating on the role with its potential benefits, responsibilities, collaboration opportunities, and formal job description, we aim to merge contemporary theory based on an ecological dynamics rationale with a "pracademic" perspective on athlete development and performance preparation. Constantly highlighting an athlete-environment-centered perspective on coaching, several concepts such as representative learning design, alive movement problems, and dexterity are

brought to life by introducing two unique case examples from professional European soccer and American football in the NFL. We hope this paper will spark some fruitful discussions about the benefits of involving SAS in organizational practices amongst coaches, department heads, general managers, and key stakeholders within high-performance sports.

Finally, we would like to share insights from some of the world's leading SAS on this invaluable role within high-performance sports:

Skill Acquisition Specialist, Major League Baseball (USA)
"I would say that teams need a SAS because skill acquisition plays a role in almost everything they do – S&C, practice design, using analytics, scouting can all be made more effective when viewed through a skill acquisition lens. More specifically, there seems to be a constant tension now between managing player workload and physical wear and tear and getting enough "practice reps" – one of the best ways we can achieve this is by getting the most of the practice time we can!"

Skill Acquisition Specialist and Olympic Canoeing Coach (United Kingdom)
"Imagine a co-coach working collaboratively alongside you, someone who excels in theoretical and empirical understanding of motor learning and perception and how that can be applied to design environments rich with enjoyment, choice and progression. Well, that coach exists, and they are called skill acquisition specialists, a role every sporting organisation would do well to engage."

Skill Acquisition and Coach Development Consultant (Australia)
"In the copycat world of sport, where small improvements can make a big difference, a good skill acquisition specialist can support organisations to leverage the science of skill learning (i.e., enhance current practice/explore next practice) and align diverse areas of expertise (coaching, performance support) to help players reach their potential."

Director of Performance Science, Major League Baseball (USA)
"I would start with the humility that sports organizations don't 'need' us, however, the themes which skill acquisition scientists drive; acknowledgement of the individual (whether player or staff), understanding of the environment, and value placed in communication, are all concepts which sports organizations struggle to manage. A methodological approach, theoretical framework(s), and ability to collaborate across boundaries allows skill acquisition professionals to provide a unique and valuable resource to the applied challenges faced at both an organizational and individual level, unlocking potential and sparking change within athletes and staff. Talent pathways, systematic physical development, and analytics are redefining the landscape of performance and elevating the bar for success. As sports evolve, training approaches based on historical precedents no longer prepare athletes for the new heights they will have to attain for future success. Skill acquisition experts hold the key to reframing training and learning to prepare athletes for the unknown challenges that they will need to conquer in order to be successful in the constantly adapting and evolving sports landscape of the future. In a world where "more" is no longer a solution to improving skill, it will be the best use of the most valuable resources of time and repetitions which will define successful sports performance."

Skill Acquisition Specialist and Senior University Lecturer (Ireland)
"I believe high performance sport environments may benefit from engaging in the services of skill acquisition specialists to continuously sense-check the application of evidence in the applied setting. Skill acquisition navigates the crossroads between practice and performance and a mediator can ensure excellence is achieved through the challenge of rigour where tradition may otherwise direct opinion and decisions."

High-Performance Director, Major League Soccer (USA)
"High-performance sport organizations can benefit greatly from having skill acquisition specialists in their staff. Those in charge of

designing training programs in elite sports today need to have a better understanding of how athletes learn and process coaching information. In particular, effective coaching can only exist in an environment where athletic movement can be influenced and changed over time. The presence of skill acquisition specialists can ensure that the coaching methodologies implemented may result in the designing of a learning-rich environment that elite athletes can explore to improve movement and skill."

These comments from applied experts in skill acquisition and coaching emphasize the beneficial effect of SAS on maximizing practice quality, time and methodologies. They also point to the influential role of SAS in building bridges between departments while supporting effective cross-departmental initiatives towards shared theoretical principles for practice design, individualized athlete development, and performance.

Endnotes

1. A detailed discussion of this related literature is beyond the scope of this article. Interested readers should refer to the work of Myszka et al. (2023a).
2. As a detailed description of a practical IDP process, displaying the close collaboration between specialist coaches, SAS, and further support staff, would exceed the scope of this paper, please see Otte, Davids, et al. (2020) and Otte, Rothwell, et al. (2020). Here, the first author (also a lead author of this paper) and colleagues provide case examples on soccer goalkeeping, including an elaboration of individualization in practice with players at the center of the learning process.

Authors' Declarations

The authors declare that there are no personal or financial conflicts of interest regarding the research in this article.

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