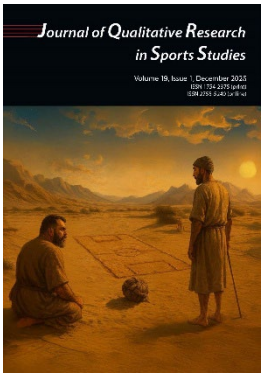
Published by:
Social Inquiry Press: University of Lancashire, Preston, UK.
Date Accepted for Publication: 1st November 2025



Journal of Qualitative Research in Sports Studies

Volume 19, Issue 1, December 2025

Athlete individualisation: Using Interpretative Phenomenological Analysis to capture elite coaches shared mental models in paralympic sport

[1] Scott Simon (University of Lancashire, Preston, UK)

[2] Pamela Richards (University of Lancashire, Preston, UK)

ISSNs: 1754-2375 [print] 2755-5240 [online]
ISBN: 978-1-0683365-1-5 (320 pages)
JQRSS Article No: 2/10-19-1-2025-PG[133]-195

To cite this article:
Simon, S. and Richards, P. (2025) Athlete individualisation: using Interpretative Phenomenological Analysis to capture elite coaches shared mental models in paralympic sport. *Journal of Qualitative Research in Sports Studies*, 19, 1, 57-76.

URL link to this article:
https://www.academia.edu/145529331/Scott_Simon_and_Pamela_Richards_2025_Athlete_individualisation_using_Interpretative_Phenomenological_Analysis_to_capture_elite_coaches_shared_mental_models_in_paralympic_sport_Journal_of_Qualitative_Research_in_Sports_Studies_19_1_57_76

Advice to submitters - JQRSS Guide to Contents & Open Call for Papers:
https://www.academia.edu/3513281/JQRSS_Overview_Guide_to_Contents_and_Editorials_by_Volume_-_Open_Call_for_Papers

JQRSS Mapping of Articles (2007- to date):
https://www.academia.edu/8827414/Mapping_of_JQRSS_articles_across_Undergraduate_and_Postgraduate_research

Online Indexing – Open Access Research Platforms:
EBSCO Host: https://www.ebsco.com/products/ebscohost-research-platform
Google Scholar: Dr Clive Palmer PhD, National Teaching Fellow, PFHEA, UKCGE
Academia.edu: https://uclan.academia.edu/ClivePalmer
ResearchGate: http://www.researchgate.net/profile/Clive_Palmer

Simon, S. and Richards, P. (2025) Athlete individualisation: Using Interpretative Phenomenological Analysis to capture elite coaches shared mental models in paralympic sport.
Journal of Qualitative Research in Sports Studies, 19, 1, 57-76.

Athlete individualisation: Using Interpretative Phenomenological Analysis to capture elite coaches shared mental models in paralympic sport

Scott Simon and Pamela Richards
University of Lancashire, Preston, UK.

Keywords: *elite sport, coach observation, high-performance sport, paralympic sport*

Abstract

Shared Mental Models (SMM), are critical for optimising performance in sports, particularly within team contexts where they enhance coaches decision-making. While research has explored SMMs among team sport, there is a notable gap within coaching and individual sports. Addressing this gap, this study applies a unique and innovative design to examine how coaches tailor SMMs to individual athletes, with a specific focus on Paralympic sport. Using the sport of canoeing as a case study, this research captures the integration of knowledge to align a multi-disciplinary team around individualised athlete SMMs. Utilising Interpretative Phenomenological Analysis (IPA), methodology, the study provides a unique insight from the 'lived experience' of Paralympic Coaches (n=3), working within a World Class Programme, providing original insights into athlete preparation. Findings suggest that individualised SMMs, tailored to the athlete, task and setting, are essential for effective performance in Paralympic environments and offer five applied implications for coaching.

Introduction

Shared Mental Models are essential for successful performance in the sporting arena (Richards, 2009). Predominantly employed within a team context SMMs facilitate enhanced decision-making and improve the co-ordination of players in operationalising strategic plays, such as offensive set pieces (Richards *et al.,* 2012). Research has predominantly focused on the SMM in team sport athletes (Richards *et al.,* 2012; 2017), with limited attention directed towards coaching (Ashford *et al.,* 2022). No research to date has focused on the complexity of how coaches individualise coaching and tailor generic mental models to individual athletes. We argue this is essential in all sports, but is imperative in Paralympic sports, where there is a temptation to take SMMs from non-disabled sport and apply them to Paralympic athletes (Simons and Richards, 2022). No published studies to date have considered the SMMs and the technical needs of an athlete within individual sports. Using the complexity of the Paralympic environment, this study captures the unique

perspective of SMMs within Paralympic canoeing. Specifically, it focuses on the integration of knowledge to construct, define and align the multi-disciplinary team (coach, physiotherapist, strength coach etc.), around a bespoke performance vision (SMM), which is individualised to the performer. Accordingly, we argue that a one size (performance vision), does not fit all and that preparation benefits from using SMMs, which are 'individualised' and made bespoke to the athlete, task (event), performance level and setting. The focus is therefore, on providing the reader with empirical evidence which demonstrates the necessity to define, co-create and operationalise a SMM, which can be individualised to the performer. This paper captures the lived experience of elite coaches during this process, through the lens of Paralympic coaches utilising Interoperative Phenomenological Analysis (IPA: Smith, 2011).

Individualising shared mental models

In constructing an individualised SMM of performance for an athlete, coaches will seek to understand important kinematic and biomechanical patterns, which must be personalised for that individual and adapted from a more generic technical template (Collins *et al.,* 2018; Simon and Richards, 2022). As such, if a more vivid, robust, and accessible individualised SMM of performance is available, knowledge retrieval is faster, more consistent and more efficient (Seegelke and Shack, 2016). In operationalising the SMM, Simon and Richards (2022), highlight that the co-creation of the SMM results in more effective co-ordination of management teams in supporting athlete individualisation. However, individualisation within most real-world coaching contexts involves complex practical challenges in tailoring SMMs to the athlete, which challenges the coach's ability to manage and co-ordinate the coaching process (Simon and Richards, 2021).

In addressing these challenges, coaches integrate their expert technical knowledge, augmented by multi-disciplinary experts in a manner that aligns a congruent vision, individualising the SMM of performance and providing a blueprint for athlete development (Simon and Richards, 2022). Through these knowledge sources and in line with previous studies (Cotterill and Discombe, 2016), the exchange and implementation of expert practice within dynamic environments inform the coach's ability to create diverse knowledge representations or SMMs. The SMM aims to satisfy the athlete's performance needs through a range of aligned professional lenses, such as technical coaches and multi-disciplinary experts (Simon and Richards, 2022). Consequently, given the established need of the coach to augment their knowledge through sources such as SMEs, a defined and agreed upon SMM will be critical in understanding and enhancing athlete performance. Accordingly, collaboration within a coaching team to individualise coaching interventions are a key component in developing an athlete's performance (Jowett and Arthur, 2019).

Focusing on this complexity, this paper explores how individualising these SMMs can be understood and adopted by a team of performance specialists, who collaborate to enhance individualised athlete performance in a World-Class Paralympic team. In addressing this challenge, we first outline the method and procedures, before subsequently presenting the analysis. The results are then organised into two parts before key findings are discussed. Finally, implications for coaching are offered.

Method

Study Design. Utilising IPA methodology (Smith, 2011), an elite group of Paralympic coaches working within a World Class Programme provided a unique lens into team preparation for the Paralympic Games. Specifically, the research design focused on understanding how experts working in a high-performance Paralympic team, co-created an SMM, that is individualised to Paralympic athlete. IPA allows the participants studied to give meaning to their experiences and the complexity of the coaching environment to gain first-hand accounts (Rajasinghe, *et al.,* 2024).

Participants. In meeting qualitative enquiry paradigms, population representation is an important consideration (Marshall, 1996). Smith *et al.* (2009:48) states that 'sampling must be theoretically consistent with the qualitative paradigm'. For IPA, this means that samples are selected purposefully. Accordingly, a purposive sample of three elite coaches who lead multi-disciplinary teams was identified for this investigation, that enabled access to the entire population of elite coaches working within Paralympic canoeing nationally. IPA sample sizes follow the recommendations of Smith *et al.* (2009). All participants within the sample were paracanoe coaches, coaching within a National Team World Class Performance department and employed on the Paralympic programme (Mage = 40.0; years ± 8). Coaches were male and held the Sports National Governing Bodies highest caching award. To ensure a sufficient level of domain expertise, the following inclusion criteria were applied: (1) a minimum of 5 years of coaching experience since senior accreditation within paracone specialist paddle-sport; (M = 5.4 years ± 1.0); (2) have coached athletes at a Paralympic Games and be currently working within paracanoe with athletes. Steps have also been taken to avoid deductive disclosure and coaches designated a numerical identifier. A summary of participating coaches and their experience can be found in figure1 below.

Equipment: Data were recorded using a digital Dictaphone and stored electronically in an mp3 file format in a secure encrypted external hard drive.

Procedure: IPA interviews (figure 2), allowed the respondent to talk freely and at length, with probes deployed when necessary to funnel general views to more specific ones (Smith and Osbourne, 2015). Participants were encouraged to consider

and explore the process through which they gathered information when coaching and how it was analysed, integrated and applied in action, to provide real-time feedback to the athlete. Interviews lasted on average 90 minutes.

Figure 1. Demographic Data of Coach Participant

Coach	Age (years)	Highest qualification held	Years of World Class Programme Paracanoe coaching experience
1	37	Level 3 coach –Paracanoe programme	5 years
2	48	Level 3 coach –Paracanoe programme	6 years
3	35	Level 3 coach –Paracanoe programme	5 years

Figure 2. Interview Schedule Guide

Questions
1. Can you tell me about a recent coaching episode in your field?
2. What do you think makes a good coaching observation
3. Do you have a defined technical template for a movement/stroke/skill in your field?
4. Can you tell me about how you structure your observation of your athletes?
5. How do you adapt your mental model of performance?
6. How do your technical template and SMM interact?
7. Who is important in supporting the process of individualising the SMM?

Data Analysis

Transcripts were analysed using IPA (Smith, *et al.,* 2009), and personal coaching pedagogical practice linked to the 'lived' experiences of the coach (Richards *et al.,* 2015), (figure 3). Audio recordings were transcribed verbatim and anonymised. Transcript data was then read and re-read, as an immersive process to familiarise the first researcher with the narrative. Coding was verified and confirmed within the research team supporting validity and reliability of coding.

Inductive and deductive analysis was conducted on the transcribed interviews for each coach that allowed phenomenological and interpretative themes in a hermeneutic process (Smith, 2009), in line with the steps suggested by Richards, Penrose and Turner (2015). Coding at an individual level was conducted, and a list of initial themes generated for each participant. Discussions were held within the research team relating to the identified themes. Individual themes were then checked before being examined in relation to cross-case comparison to establish connections and to identify 18 subordinate themes. Following individual case analysis, group

analysis was performed. Minor changes were then made to the clusters to identify four superordinate themes (Smith and Osbourne, 2015).

Figure 3. Outline of the IPA Process

Stages of IPA	Description
1	**Preparing the study.** Study design: objective of study, inclusion criteria, sample size, sampling, data collection method.
2	**Data collection** Collecting rich and personal data of the participants lived experience.
3	**Analysing the data** Data analysis is complex and involves a series of analysis steps. Data can be analysed at an individual level, group level or both. Shaw (2015) presented a nine-step procedure to IPA data analysis. Shaw's (2015) steps for IPA analysis are as follows: i. Familiarise yourself with the data. ii. Phenomenological coding. iii. Interpretative coding. iv. Identification of themes. v. Clustering themes. vi. Peer review (not in all cases). vii. Multiple case analysis – moving to another individual case. viii. Integrative analysis – compared across cases. ix. Construction of a narrative.
4	**Presentation** of findings - writing up IPA analysis and reflexivity.

Results

Figure 4 presents the four superordinate themes and their relationship to the 18 sub-ordinate themes they were derived from.

Figure 4: Subordinate and Superordinate Theme Relationship.

Super-ordinate Theme	Sub-ordinate Theme
Sources of Knowledge	Understanding the athlete
	Sources of knowledge (experience)
	Sources of knowledge (experimentation/innovation)
	Sources of knowledge (experts)
	Sources of knowledge (formal learning)
Individualising the SMM	Fixed generic MM elements (coaching beliefs)
	Comparison of technique (para-para) (non-non) (non-para)
	Individualised athlete MM
	Development of the SMM (coach-expert-athlete)
Observation of the SMM	Challenge of observation
	Observational strategy
	Objective measure of performance (technology)
	Subjective measure of performance
	Critical thinking/problem solving
Leading the SMM	Naturalistic decision-making
	Sense-making
	Pattern recognition
	Leadership

The four superordinate themes were: Sources of knowledge; Individualising the SMM; Observation of the SMM; Leading the SMM. The narrative below outlines a detailed account of each theme before implications are discussed.

Superordinate Theme 1: Sources of Knowledge

The first Superordinate theme consisted of five subordinate themes, which were:

1) Understanding the individual athlete
2) Sources of knowledge (experience)
3) Sources of knowledge (experimentation/innovation),
4) Sources of knowledge (experts)
5) Sources of knowledge (formal learning)

1. Understanding the Individual Athlete: The individual as a person and an athlete sat at the heart of a holistic process. All three Paralympic canoe coaches reported developing a deeper understanding of the individual athlete as fundamental in helping to inform and develop their SMMs. Through this understanding, the

coaches were able to adapt the generic technical elements and generate SMMs to the bespoke needs of the athlete and their impairments. Coach 1 describes the process: 'Different abilities, functions, lever lengths. Then working with athletes through trial and error, discussion, and monitoring performance data to decide what avenue to go down or not'. Crucially, the understanding of the individual's none-technical elements of performance was considered just as important as testified by Coach 3: 'I think it's just how quickly you can understand the person, how quickly you can recognise how they learn, what they'll learn'. Therefore, understanding both the technical and none-technical nature of the individual's disability, the athlete as a person and the performance potential of the athlete, allowed the coaches to individualise their practice. Accordingly, in collaboration with the athlete, an SMM could be created, and individualised goals agreed upon. In simple terms, the coach and athlete cannot do it alone (Jowett, 2017), and both need each other to achieve in sport (Jowett and Shanmugman, 2016).

2. Sources of Knowledge (experience): The coaches all highly valued their experiences as critical in developing their working knowledge of, and context of the SMM as described by Coach 1: 'What has worked and what hasn't. It's constantly updated by what I am doing day to day'. Through this experience, the coaches were able to adapt generic templates and continually modify them into individualised SMMs. The analysis showed the coaches all considered the understanding of the nuanced elements of parasport as a lengthy process that was developed through experience over multiple years. Paracanoe Coach 2 elaborates: 'Pure experience, absolutely time, you can't stress how important it is, the more people you deal with, the more you understand the person'. Therefore, with experience, the coaches developed a richer understanding of how to individualise their coaching and develop bespoke SMMs.

3. Sources of Knowledge (experimentation/innovation): Experimentation and innovation was considered important to adapt generic templates in developing an individualised SMM. Experimentation was required owing to the complexity of the sport and the bespoke needs of the athlete. Through this experimentation process, the coaches informed their understanding of how the athletes produced technique within the constraints of their impairment and extended their knowledge and understanding of the athlete. Coach 3 explains: 'I made a template and a scoring system, and I went through with it. What I learned, whether pictures are right or not, I am likening it to something. I've got a zero point'. Accordingly, the coaches were able to modify and assess the effectiveness of the SMM whilst concurrently developing a deeper understanding of the athlete. However, the effectiveness of any innovation derived from such a process was not always clear as Coach 1 explains: 'Some you have to go through an element of trial and error and after the trial and error may be the performance impact is so minimal you can't measure it'.

Consequently, in innovating effective interventions coaches were forced to search for information and in the process develop their expertise. Coach 2:

> 'You actually become curious and go off and read something. But that something is relevant to what you are trying to do rather than just looking at something holistically because you have had them check and challenge. It allows you to get there'.

Experimentation was considered important by all three coaches in meeting the challenge of individualising the SMM and develop context specific knowledge in the absence of a 'rule book'. Hence, overcoming the challenges of adapting none-disabled expertise as highlighted by Fairhurst *et al.* (2017), or the deficiencies in coach education highlighted by Wareham *et al.* (2018).

4. Sources of Knowledge (formal learning): All three coaches reported very little paracanoe formal education either through the Governing Body or other education pathways. Coaches identified attending none-disabled courses for technical content, with the emphasis being placed on their own coaching skill to manipulate that knowledge for their role as Paralympic coaches. What formal learning was available was derived from none-disabled coach education and not considered relevant for the paracanoe setting as Coach 3 explains: 'It's derived from able-bodied. We had a lot of pushback when we first did this even from myself. We work beyond this template. We create, we have to come up with these ways around it'. In working beyond the template, the coaches identified the need for para-specific technical information to supplement their knowledge. Therefore, none-disabled coach education resources had to be modified by the coaches for the paracanoe athletes. This was evidenced by all three coaches. As Coach 1 explains:

> There is a technical model we follow put together by the governing body, but it's pictures. They are of an athlete I have never even heard of, and not highly descriptive for a coaching basis. It's fine but no actual details, it doesn't define down to details. In elite coaching, you couldn't gain much from using that.

The lack of formal para-specific technical knowledge and experience forced the coaches to explore the individual elements required to construct an SMM for the athlete. In doing so they utilised informal sources of knowledge to overcome the lack and suitability of formal learning sources in common with the findings of Wareham *et al.* (2018), in studies of Paralympic swimming coaches.

5. Sources of Knowledge (experts): In overcoming the shortfalls of the lack of formal sources of knowledge, all three coaches highly valued the insight experts within the multi-disciplinary team offered. These experts helped educate coaches and contextualise their coaching knowledge. Through this knowledge exchange process, multi-disciplinary SMMs were developed. Coach 2 outlines: 'Availability of professionals and trusting their bit, I see them as my education'. Expert knowledge was sought and utilised in two informal ways. Firstly, the coaches called upon fellow

coaches, offering a breadth and depth of technical knowledge and different perspectives to help specifically develop and enhance the SMM (Taylor, *et al.,* 2014). Secondly, conversations with the specialist support staff helped to develop a better understanding of the athlete as a performer and as a learner, in turn inform the SMM, (Townsend *et al.,* 2018). Paracanoe Coach 3:

> I have sucked information from everyone, support services have helped with my vocabulary, and helped with how to explain things. Conversations with other coaches, watching other coaches, watching other athletes, speaking to other coaches. Everywhere working with SandC, the physios.

The knowledge gained through expert sources was critically assessed against the coach's own extensive experience, and the quality of knowledge from within the expert support network. Such process supports the need to critically challenge coaching beliefs and allow 'desirable difficulties' (Richards and Collins, 2022), to be discussed in a psychologically safe environment (Gosai, *et al.,* 2021). The coach's community provided expert knowledge and acted as informal mentors in transferring and adapting knowledge. This knowledge exchange process supports the preference for the social construction of knowledge, highlighted by Simon and Richards (2022).

Superordinate Theme 2: Individualising the SMM

The second superordinate theme was made up of four sub-ordinate phenomena. These were:

1) Fixed generic SMM elements (coaching beliefs).
2) Comparison of technique (para-para) (none-none) (none-para).
3) Individualised athlete SMM.
4) Development of the SMM (coach-expert-athlete).

1. Fixed generic SMM elements (coaching beliefs): The coaches all reported having fixed beliefs and non-negotiables upon which their generic templates were built. Unsurprisingly, these beliefs were linked to the formative experiences that the coaches were exposed to throughout their careers working in mainstream sport. Firstly, as athletes themselves, and secondly as coaches. Coach 3 describes: 'It's taken from the starting point you had from the able-bodied and possibly your own experience as an able-bodied athlete and taken it to where you have got to now'. Using these self-constructed tools, the coach was able to conceptualise how the athlete was solving the performance problem, and consequently individualise the SMM to the athlete. Coach 1 describes their process: 'Try to pick out none-negotiable key points within stroke that have absolutely to be in place. For example, you don't want the paddle blade to go over vertical'. While all the coaches reported utilising fixed beliefs to guide their observational processes, the beliefs the coaches had developed appeared to be idiosyncratic and linked to the coach's experiential journey. Therefore, any SMM may be linked to the development of experience supporting Collins *et al.* (2018), findings in a study of similar paracanoe coaches.

2. Comparison of technique (para-para-none-disabled): The coaches all reported obsessively searching for an SMM to help solve a movement problem through the comparison of other athletes' techniques. This comparison was informed through the assessment of world-leading non-disabled athletes (Olympic Canoe-sprint), and Paracanoe athletes, both intra and inter-group as described by Coach 3: 'I am constantly assessing technique, looking at able-bodied technique. If you look at look the French X (Olympic) look at Y, the German (Paracanoe), the 1000m guys, (Olympic) great technique. But you know what, they are all different'. Through this comparative process, the coaches were able to identify the fundamental elements of performance that their athletes were functionally capable of achieving. Further, the process aided critical thinking, knowledge generation and problem-solving in helping to identify areas of conceptual and technical development that were unique to the paracanoe athlete they worked with. Such a position reflects the nature of the SMM as possibly more conceptually driven in line with Järvelin and Wilson's (2003), view of how the user explains the system they observe, rather than being technically driven through component parts. In this case, the coaches return to a set of fundamental principles and concepts they recognise within the observation, rather than basic technical elements.

3. Individualised athlete SMM: Within paracanoe, the coaches recognised that individual athlete variance was high owing to the unique interplay of impairment and technique. Consequently, the need to adapt and individualise SMMs to the person was highly valued. The understanding of the person at the heart of the performance was considered critical by all of the coaches as Coach 3 describes: 'I have that template, but I am really aware that everyone's different and there are some key factors that need to be great but not everybody can get to all of those key factors', illustrating that a unique SMM has to be created for each athlete, even if there are commonalities in technical components. Coach 1 describes:

> It's more individualised [to the person] rather than classification specific. I think things like length of levers has a massive impact as well, it's not disability specific. Different people in and within different classifications will have different limitations therefore you have to explore the individual functionality.

A deeper consideration the individual needs of the athlete, allowed the coaches to adapt their SMM of performance. Indeed, the desire of the coaches to create bespoke athlete SMMs allowed them to reject the overlaying of none-disabled templates as described earlier. Instead, with experience, they were able to overcome the limitations of formal knowledge sources and balance their approaches against the passed-down coaching craft (Chow and Knudson, 2011).

4. Development of the SMM (coach-expert-athlete): All the coaches interviewed reported valuing the use of expert knowledge in the development of the SMM, owing to the deficiencies in the coach's educational and experiential

knowledge. The insight the experts brought within a specialist area, such as anatomy or physiology, was considered essential in the effective adaption of any SMM. Coach 3 describes this experience: 'He was taught [athlete] how he should use his abs, how to use his movement. I had no idea how to do that, that was above me, the physio managed that'. In this example, the coach was able to facilitate a bespoke solution for the athlete that was beyond the boundaries of their knowledge. Therefore, the coach needed to enhance their own knowledge sources through the multi-disciplinary experts contribution. The coach was able to contextualise this new knowledge, and through this process the SMM was augmented and made more effective through the application of specialist expertise as Coach 2 explains:

> The team around the athlete. So, the strength and conditioning coach, the physiologist if you have one. I have spoken to nutritionists and physio before, get them out see what they are seeing. Listen to what the athletes say, collectively what is the solution.

Through this collaborative process, the experts within the support team were encouraged to share their observations and interpretations of athlete performance through the lens of their specialist knowledge, with the coach making the knowledge exchange usable in context. In this way, the SMM was further defined and refined within the team, allowing alignment of effort in improving performance.

Superordinate Theme 3: Observation of the SMM

The third superordinate theme was made up of five sub-ordinate phenomena. These were:

1) Challenge of observation.
2) Observation strategy.
3) Objective measures of performance (technology).
4) Subjective measures of performance.
5) Critical thinking/problem-solving.

1. Challenge of observation: Despite their status and experience of paracanoe, observing athletes in real-time was at times challenging for the coaches interviewed. Reportedly, this was due to the speed of the forward paddle-stroke cycle that could reach 170 strokes per minute challenging the observation process as described by Coach 3: 'The challenge comes when you have this great technique at 70 stroke rates and it goes to 100, 110, 115, 120 that's when it [observation] all goes out the window', highlighting the challenge observation poses to the coach in a real-world context and in making accurate decisions (Lees, 2010). While the observation of technical elements was a challenge, conceptualising how the athlete was delivering the fundamentals of performance they observed within the SMM was also an issue. Coach 2: 'I find it hard to be really critical at that level, as I haven't got the experience. I haven't been there as an athlete at that 130, 140 strokes a minute'. The limitation of the coach's observational boundaries appeared to decrease with experience of paracanoe and through the increased understanding of the bespoke

SMM related to the athlete they worked with. Importantly, considerable observational challenge may be experienced at least initially, for any coach transferring into paracanoe.

2. Observation strategy: In overcoming the challenge of complex observation, the coaches all reported developing bespoke observation strategies linked to their own generic templates of performance, that fed into a SMM as Coach 3 explains: 'I have these pictures, I have the set-up, lock the blade, essentially catch, dry phase, weight on blades, end of pull and exit. So basically, a stroke is broken down to six points'. Through this strategy, the coach was able to chunk down their observation into key phases derived from the SMM to reduce the cognitive load and allow them to observe a specific element of the stroke at high rates. To further reduce cognitive load, the coaches all reported continuing their observation process post-session as Coach 1 describes:

> Have a clear idea of what they need to work on, so you need to observe what they are doing. Look in slow motion, spend plenty of time to find out what's happening over a period of time and not jumping to conclusions.

The use of an observational strategy informed by the SMM supports the view of Lees (2010), in that observation within live sporting settings is hampered, whereby feedback to or from the athlete may be limited. For example, such as the ability of the coach to enter the field of play or under time pressure.

3. Objective measures of performance (technology): Technology was considered critical by the coaches in helping to overcome the challenge of live observation as Coach 2 describes: 'I really struggle with being critical at that speed. That's what I have to use the video for'. Additionally, technology allowed variables that were not explicit within the SMM such anthropometry of the athlete to be considered by the coaching team. However, owing to the physical environment preventing live data visualisation, and the time needed to download data, any use of technology was often reviewed and analysed post-session. In this way, post-session technology was utilised by the coach to provide insight into how the interplay between the fixed elements within the SMM was being integrated into a unique technical performance by the athlete (Chow *et al.,* 2016). Consequently, coaching practice could be developed and applied to meet the needs of the athlete and the application of the bespoke SMM.

4. Subjective measures of performance: The coach's subjective observation of performance was operationalised through the interplay of coaching experience, pedagogical understanding and athlete feedback, in monitoring the SMM within the live coaching session. The coaches sought to understand how the athlete and the nature of their impairment, were meeting the demands of the sport (Simon *et al.,* 2017). However, in meeting bespoke athlete needs, understanding just what the

athlete was doing, and consequently what subjective measure to deploy, often needed collaboration and supplementation from the athlete and other experts in forming a SMM they could work from. Coach 2 describes this:

> So, I would see myself as the engineer and the athlete needs to be feeling things, to me, for me the engineer, to help them make those changes or to speak to other people to help them make those changes.

Accordingly, the subjective measure initially employed by the coach were adapted and utilised by the athlete and support team as the basis for the in-session observation of the SMM (Lees 2010). Importantly, in common with other sporting situations challenges remained for the coaches in that while the use of subjective measures was common (Holder and Winter, 2017), the accuracy of the observation was often questionable. Therefore, impacting the coaching efficacy of any feedback (Giblin *et al.,* 2015).

5. Critical thinking/problem-solving: In helping the coaches innovate bespoke athlete solutions, they reported using multiple strategies and knowledge sources. Coach 2 describes utilising expert knowledge: 'Opens up critical thinking and thought and your reflection on that. It becomes really focused which is key'. In contrast, Coach 3 describes their innovation of a profiling template to problem solve: 'And what I learned, whether pictures are right or not, I am likening it to something. I've got a zero point. I have got a place to start, I've got a basis'.

Through this critical thinking process, the individual athlete SMM became constantly informed by an ongoing audit. Consequently, experimentation, reflection and collaboration could be enhanced which led to further innovation of the SMM. Therefore, the technical elements of an SMM (the what), were supplemented and made useable by the psycho-social elements (the how), as expertise is integrated to socially construct a shared model (Richards *et al.,* 2017).

Superordinate Theme 4: Leading the SMM

The fourth superordinate theme was made up of four sub-ordinate phenomena. These were:

1) Naturalistic decision-making.
2) Sense-making.
3) Pattern recognition.
4) Leadership.

1. Naturalistic decision-making: In managing the real-world challenges imposed on their observational process, the data illustrated all three coaches utilised Naturalistic Decision Making (NDM: Klein, 2015) responding to clues, hunches, and intuition as reflected by Coach 1: 'You are down to gut instinct'. The coaches reported responding to shapes and patterns they valued through their experience (Klein, 2015), to make decisions in their real-world setting. However, the coaches

were very aware of the boundaries of their expertise and while happy to go with their gut within the session, utilised technology to gather evidence and review their decisions post-session. Therefore, the coaches were able to contrast their observations and check and challenge the in-session observations and assumptions. The utilisation of NDM processes by all three coaches within real-time coaching allowed them to quickly respond to their athletes by being less heavily reliant on cognitive resources. Consequently, within real-time sports coaching, NDM may be more suited to situations that have less comprehensive information available and are time-pressured (Klein, 1998), such as the competitive environment. The body of current NDM sporting research is situated in none-disabled team sports and the strategic interaction between the athlete, the game, and the coach, (Richards 2012; 2017; Ashford *et.al.,* 2020).

2. Sensemaking: In generating new knowledge and constructing meaning for themselves and those within the support team, the ability to sense-make (Weick, 1995), was considered important. Coach 1 states: 'Other coaches, other athletes, my own reflection, what has worked and what hasn't'. Sensemaking allowed the coaches to analyse events retrospectively, connect dots and anticipate future actions in noticing information, supporting Macquet and Kargba's (2015), view of sensemaking. Through this process the coaches were able to build conceptual frames to identify a performance vision they could work from (Richards *et al.,* 2017). The use of sensemaking appeared to have developed as a serendipitous by-product of having no paracanoe rule book, and a very close working relationship with the athlete and support team in developing the SMM as described by Coach 3: 'Having a physio in terms of understanding a disability like that, just someone saying he's too new to injury he doesn't know how to use his body like that yet', highlighting how the coaches utilised a collaborative sensemaking approach to utilise expert knowledge sources (Duffy *et al.,* 2013), which allowed the team to consider the fundamental question of what was happening. Through this process, knowledge was generated and made useable through the explicit integration of the athlete and experts within the support team to construct meaning. Consequently, the use as sounding boards of athletes and experts in the observation process allowed the refined understanding of the SMM informed by the situational demands of the performance (Simon and Richards, 2022).

3. Pattern recognition: In working 'intuitively' the coaches all reported recognising and responding to familiar and typical patterns within the situation they faced. As Coach 3 described: 'You see the patterns', and Coach 1: 'You should be able to join the pictures up a little bit and work out what is and what isn't important to the technical model', illustrating that the coaches recognised and worked from movement patterns (Klein, 2015). Through the recognition of typical and familiar, key patterns made by the athlete, the boat and the paddle, the coaches appeared able

to match technical components of the observed SMM, to those stored in memory. Consequently, the coaches were able to run mental simulations to decide on the direction of the coaching intervention. The use of pattern recognition in this way would appear to show similarities to the use of Klein's (2008; 2015), Recognition Primed Decision-making model (RPD; Klein, *et. al.,* 1986), within this sporting context where all three coaches reported matching cues and patterns within their observation of the athlete performance. Consequently, the coaches recognise, match, and connect dots to respond intuitively by interpreting the cues to find solutions. The use of RPD in a coaching and Paralympic context would expand the use of Klein's model and insight into NDM within an individual sports context although this requires further research.

4. Leadership: In defining, refining, and aligning behind an individualised SMM, all three coaches recognised the importance and contribution of the wider athlete support team in the exchange of and generation of new knowledge and their role in leading these teams (Gosai *et al.,* 2021). In doing so, the coaches recognised they had created a multi-disciplinary team of experts around them. Such a network prevented coaches from neglecting multi-disciplinary contribution or working in discipline silo's as they integrated expertise from multi-disciplinarity team (Alfano and Collins, 2021). Instead, boundaries between discipline silos were reframed as permeable to allow knowledge transfer whilst retaining subject expertise (Simon and Richards, 2022). In supporting this collaborative process, the coaches reported having to fill a distinct leadership function to co-ordinate effort (Jowett, 2024). Coach 2 describes this process: 'I see that as the team around that athlete is that something I have picked up from previous managerial experiences where everybody is part of your team and equal. There's lots of managerial skill I take to my coaching'. However, to be effective within this leadership function, the coach had to accept they were not the font of all knowledge within all aspects of the SMM. Accordingly, they had to create psychologically safe environments that allowed those with greater expert knowledge to lead the coaching process when appropriate (Jowett, 2024; Simon and Richards, 2022). Coach 1: 'Check what other people are doing and constantly learn. What you view. You never ever get to a point that you are an expert, you always got to have to keep pushing and finding out more information', suggesting the coaches recognised the need for more experienced members of the team to lead specific areas of the coaching intervention and development of the SMM. Through the distribution of leadership, and the coach empowering the most appropriate expert to lead the development of the SMM, individualised elements of performance could be made more effective. Importantly, if leadership is a distinct function of coaching within this context, then it should be considered important by coach educators.

Discussion and implications for practice

The narrative above capturing lived experience of the unique lens of Paralympic coaches enhances our understanding of the complexity which lies behind working in this dynamic context. The identification of the four superordinate themes and the corresponding subordinate themes provides a unique and original insight into the coaching process of working in high performance Paralympic sports. In summarising the findings from the above case study, this paper argues that the construction of SMMs within a high-performance setting provides a framework for coaches and other multi-disciplinary experts to use as a 'scaffold' to define, align and deliver performance. In addition, the construction of any SMM needs to be made bespoke not only to the context (Richards *et al.,* 2009), but also the athlete (Simon and Richards, 2021). We would argue this is the case for all sports (non-disabled and disabled). However, within Paralympic context this process is heightened owing to the increased complexity of integrating the parameters of the performance setting and physical disability (Simon and Richards, 2022). The insights provided within this paper are also supported at the applied level, with the team achieving multiple medals at the Paralympic Games (n=7). It is hoped that the paper provides support for the coaches already working within disability sport, whilst also opening discussions as to how as a research and applied community, we can more effectively support the development of the coaches working within parasport. We believe these insights in turn, will result in the construction and design of more effective coaching environments which support the personal development and growth of the athletes within it. In considering the above, we outline the following implications for practice.

Implications for coaching: This work has facilitated much reflection with five key implications for coaching offered by the authors:

1) Observation in real-time is a complex and challenging process. The ability for coaches to manage this complexity by refining and updating SMMs in 'live' training sessions is challenging. SMMs in this context provide a focus for what technical aspect needs to be attended to by the coach, removing cognitive 'noise' and provides and order in which the coaching process may be delivered - providing a structure to the feedback. Such a process requires coach educations to address how SMMs are developed and used.

2) Competition and training environments within the sporting context studied are complex, fast-paced and often devoid of performance analysis technology placing a high cognitive load on the coach. Within these complex coaching environments, a bespoke SMM is essential to help mitigate coaching cognitive load, as information needs to be personalised in 'real-time' to the athlete. SMMs may help reduce cognitive load on the coach, bring congruence as SMEs and give clarity as to

the individual athlete's technical need and appropriate pedagogical technique to support the 'what and how' of performance.

3) The complexity of real-world observation required coaches to utilise NDM behaviours to manage their observation process, mapping experience to inform 'real-time' observations. Experienced coaches utilised pattern recognition through RPD to observe. The NDM process within coaching observation is informed through reflection, meta-cognition, seeking out knowledge sources to support the creation of a bespoke SMM. Accordingly, coach educators and developers should consider how they support coaches through formal and informal sources of knowledge generation, mentoring and meta-cognitive process to create individualised SMMs and inform the observation process.

4) Para-sport has limitations of formal knowledge and coach education. In response, informal knowledge exchange and creation are highly valued and help overcome the problem of having no athlete-specific 'rule-book'. A knowledge exchange process between the coach, expert, and athlete, helps to inform a deep understanding of the athlete, which informs the SMM, beyond the technical expertise of the coach. The findings have implications for coach educators and designers of pedagogues in para-sport coaching, arguing that education should be made domain specific. More simply education and SMMs cannot just be transferred from non-disabled resources. Paralympic Sport requires a deeper application of individualisation to personalise the coaching intervention.

5) Within the current study, leadership and co-coordination of multi-disciplinary experts is a core coaching skill. The need for knowledge exchange through the co-ordinated SME contribution is essential if a congruent performance vision is to be achieved. Permeable boundaries (Simon and Richards, 2022), that allow knowledge to be exchanged between disciplines, have helped remove multi-disciplinarity team silos and allowed knowledge transfer and generation. Therefore, if leadership is accepted as a distinct function of coaching, it should be developed as a core skill.

Conclusion

This study has made a unique contribution to both research and applied coaching, addressing how coaches tailor generic SMMs to individual athletes, with a specific focus in Paralympic sport. The findings suggest that individualised SMMs, made bespoke to the athlete, task, performance level, and setting, are essential for effective preparation and performance in Paralympic environments. Accordingly, this research has shown that SMMs may provide a useful tool for optimising performance in individual sport. Particularly within the Paralympic context in which they enhance coach observation and multi-disciplinary team coordination. The

research highlights the risks of overlaying SMMs from none-disabled sports to Paralympic athletes and underscores the necessity of bespoke performance visions. However, further research is required to explore the use of SMMs more widely across sporting domains, their use to support effective coach decision-making and the role of the coach as a leader.

References

Alfano, H. and Collins, D. (2021) Good practice delivery in sport science and medicine support: perceptions of experienced sport leaders and practitioners. *Managing Sport and Leisure*, 26, 3, 145-160.

Ashford, M., Abraham, A. and Poolton, J. (2020) A communal language for decision making in team invasion sports. *International Sport Coaching Journal*, 8, 1, 122-129.

Ashford, M. Cope, E., Abraham, A. and Poolton, J. (2022) Coaching player decision making in rugby union: exploring coaches espoused theories and theories in use as an indicator of effective coaching practice. *Physical Education and Sport Pedagogy.* 30, 1, 28-49.

Chow, J.W. and Knudson, D.V. (2011) Use of deterministic models in sports and exercise biomechanics research. *Sports Biomechanics*. 10, 3, 219-233.

Chow, J.Y., Davids, K., Button, C.A. and Renshaw, I. (2016) *Non-linear pedagogy in skill acquisition: An introduction*. Routledge, London, UK.

Collins, L. and Collins, D.C. (2016) Professional judgement and decision making in the planning process of high-level adventure sport coaches. *Journal of Adventure Education and Outdoor Learning*, 16, 3, 256-268.

Collins, L., Simon, S. and Carson, H.J. (2018) Para-adventure: A hyper- dynamic problem for the inclusive coach. *Sport in Society,* 22, 7, 1165-1182.

Cotterill, S. and Discombe, R. (2016) Enhancing decision-making during sports performance: Current understanding and future directions. *Sport and Exercise Psychology Review,* 12, 1, 54-68.

Duffy, T., Baber, C. and Stanton, N.A. (2013) Measuring collaborative sensemaking (pp. 561-565). In, Geldermann, J. and Müller T., Fortier S. and Comes F. (Eds.) *ISCRAM 2013 Conference Proceedings - 10th International Conference on Information Systems for Crisis Response and Management.* KIT; Karlsruher Institut fur Technologie. Baden-Baden, Germany.

Fairhurst, K.E., Bloom, G.A. and Harvey, W.J. (2017) The learning and mentoring experiences of paralympic coaches. *Disability and Health Journal* 10, 2, 240-246.

Giblin, G., Farrow, M., Ball, K. and Abernethy, B. (2015) Perceiving movement patterns-implications for skill evaluation, correction and development. *RICYDE. Revisit International de Ciencias Del Deporte*, 11, 1, 5-17.

Gosai, J., Jowett, S. and Nascimento-Júnior, J.R.A.D. (2021) When leadership, relationships and psychological safety promote flourishing in sport and life. *Sports Coaching Review*, 12, 2, 145-165.

Järvelin, K. and Wilson, T.D. (2003) On conceptual models for information seeking and retrieval research. *Information Research*, 9, 1, paper 163 [http://InformationR.net/ir/9-1/paper163.html]

Jowett, S. (2017) The coach-athlete relationship at its heart. *Current Opinion in Psychology,* 16, 1, 154-158.

Jowett, S. (2024) The coach-athlete relationship within a cross-boundary team of experts: a conceptual analysis. *International Review of Sport and Exercise Psychology*, 1-16. DOI: 10.1080/1750984X.2024.2416968

Jowett, S. and Arthur, C. (2019) Effective coaching: The links between coach leadership and coach-athlete relationship - from theory to research to practice (vol. 1, pp. 419-449). In, Anshel, M.H., Petrie, T.A. and Steinfeldt, J.A. (Eds.) *APA Handbook of Sport and Exercise Psychology* American Psychological Association, Washington DC.

Jowett, S. and Shangmugman, V. (2016) Relational coaching in sport: its psychological underpinnings and practical effectiveness (pp: 471-484). In, Schinke R, McGannon K.R. and Smith, B. (Eds.) *Routledge International Handbook of Sport Psychology*. Routledge, Abingdon.

Klein, G. (1998) *Sources of Power: How People Make Decisions.* MIT Press, Cambridge, MA.

Klein, G. (2008) Naturalistic decision making. *Human Factors*, 50, 4, 456-460.

Klein, G. (2015) A naturalistic decision-making perspective on studying intuitive decision making. *Journal of Applied Research and Memory Cognition*, 4, 1, 164-168.

Klein, G.A., Calderwood, R. and Clinton-Cirocco, A. (1986) Rapid decision making on the fireground (Vol. 1, pp. 576-580). In *Proceedings of the Human Factors and Ergonomics Society 30th Annual Meeting,* Norwood, NJ.

Lees, A. (2010) Technique analysis in sports: A critical review. *Journal of Sports Sciences,* 20, 10, 813-828.

Marshall, M.N. (1996) Sampling for qualitative research. *Family Practice*. 13, 6, 522-526.

Rajasinghe, D., Garvey, B., Burt, S., Pereira, A.B. and Clutterbuck, D. (2024) Innovative interpretative phenomenological analysis (IPA) approach in a coaching research project: implications for future qualitative coaching research and beyond. *Coaching: An International Journal of Theory, Research and Practice.* 17, 2, 301-318.

Richards, P., Collins, D. and Mascarenhas, D.R.D. (2012) Developing rapid high-pressure team decision-making skills. The integration of slow deliberate reflective learning within the competitive performance environment: a case study of elite netball. *Reflective Practice.* 13, 3, 407-424.

Richards, P., Collins, D., and Mascarenhas, D.R.D. (2017) Developing team decision making: a holistic framework integrating both on-field and off-field pedagogical coaching processes. *Sports Coach Review*. 6, 1, 57-75.

Richards, P., Penrose, S. and Turner, M. (2015) *Developing Team Decision-Making Capabilities in elite football Youth Academy Players.* Cluster for Research into Coaching CriC International Coaching Conference, Manchester Metropolitan University, Crewe, UK.

Seegelke, C. and Schack, T. (2016) Cognitive representation of human action: theory, applications and perspectives. *Frontiers. Public Health,* 4:24.

Simon, S., Collins, L. and Collins, D. (2017) Observational heuristics in a group of high-level paddle sports coaches. *International Sport Coaching Journal,* 4, 2, 235-245.

Simon, S. and Richards, P. (2022) Individualising coaching in Olympic and Paralympic worlds. an applied perspective. *International Sports Coaching Journal.* 9, 3, 382-389.

Smith, J.A. (2011). Evaluating the contribution of interpretative phenomenological analysis. *Health Psychology Review*, 5, 1, 9-27.

Smith, J., Flowers, P. and Larkin, M. (2009) *Interpretive Phenomenological Analysis*. Sage, London.

Smith, J.A. and Osborne, M. (2015) Interpretive Phenomenological Analysis (pp. 23-53). In, Smith, J. (Ed.) *Qualitative psychology: A practical guide to research methods* (2nd ed.) Sage, London.

Taylor, S.L., Werthner, P. and Culver, D. (2014) A case study of a parasport coach and a life of learning. *International Sport Coaching Journal,* 1, 3, 127-138.

Townsend, R.C., Huntley, T.D, Cushion, C.J. and Fitzgerald, H. (2018) It's not about disability, i want to win as many medals as possible: the social construction of disability in high-performance coaching. *International Review for the Sociology of Sport,* 55, 3, 344-360.

Wareham, Y., Burkett, B., Innes, P. and Lovell, G.P. (2018) Coaches of elite athletes with disability: senior sports administrators' reported factors affecting coaches' recruitment and retention. *Qualitative Research in Sport, Exercise and Health*, 11, 3, 398415.

Weick, K.E. (1995) *Sensemaking in Organizations*. Sage, London.

Ethics statement: This research was conducted with ethical approval at the University of Lancashire.

JQRSS Author Profiles

Scott Simon[1] graduated from a Professional Doctorate in Elite Performance at the University of Lancashire in 2024. He joined Scotland Rugby League Board in 2019 as Director of Pathways and is now Chair of Scotland Rugby League.

Pamela Richards[2] is a Chartered Psychologist and researcher in the School of School of Health, Social Work and Sport: University of Lancashire E: PRichards5@lancashire.ac.uk

Reviewer Comments

The paper discusses using shared mental models as a generic tool to support and facilitate improved performance in Paralympic sport. The authors' points are well made, setting out a detailed explanation of the challenges for using such approaches. As such, this research makes a valuable contribution to the corpus of coach education literature as much of the existing coach development education is focused on able bodied sports performance, and coaches having to adapt their knowledge and understanding to accommodate Paralympic performers. The methods section is well constructed, showing a rationale and justification for each aspect of data collection and analysis. The findings and discussion provide an insightful and illuminating evaluation of the data presented. A particular strength is how the authors have arrived at the themes in a coherent and logical manner. The themes identified are suitably underpinned by a range of relevant literature validating the analysis. The research is also rooted in the vocational aspect of coaching practice, discussed under the heading 'Implications for Coaching'. Overall, this paper promotes a valuable and practical understanding of shared mental models in supporting elite para-athletes who specialise in canoeing.