Game Models as Shared Mental Models in Rugby Pathways: Alignment, Development, and the Risk of Narrow Thinking

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Introduction

Rugby pathway systems are inherently unstable environments. Players move between teams. Coaches change. Campaigns are short - yet development requires continuity. Without a shared reference point, players repeatedly recalibrate to new language, tactical priorities, and evaluation criteria, meaning learning risks resetting rather than accumulating.

Game models supported by shared language are often introduced to create alignment. While typically discussed as tactical frameworks, they may serve a deeper cognitive function: operating as shared mental models (SMMs) that align perception, interpretation, and decision-making across players and coaches.

This paper argues that in multi-team rugby pathway systems, a principle-led game model can function as a shared mental model that:

- Enhances team coordination and predictability,
- Accelerates team cohesion,
- Supports smoother player transition between teams/programs,
- And critically, accelerates individual cognitive development.

However, these benefits come with risks. If applied rigidly, game models may oversimplify the game, narrow coaching perception, and unintentionally bias selection decisions.

The aim is not to advocate for dogmatic systems, but to explore how shared mental models can be used deliberately and reflectively in player development environments.

What Is a Shared Mental Model — and What Does It Mean in Rugby?

Shared mental models refer to the extent to which team members hold aligned understandings about tasks, roles, and situational priorities (Cannon-Bowers, Salas, & Converse, 1993). In team sport research, shared mental models have been associated with improved anticipation, coordination, and collective decision-making (Eccles & Tenenbaum, 2004; Richards, Collins, & Mascarenhas, 2025).

In practical rugby terms, this means:

- Players interpret cues similarly.
- They prioritise similar information.

- They predict each other's likely behaviour.
- They require less explicit communication under pressure.

For example, if defensive players share the principle of "connect first," they are more likely to anticipate inside support rather than chase individual collisions. If attacking players share the principle of "fill the field," they expect width to be maintained and can predict where space may emerge.

Shared mental models do not eliminate variability. They reduce information overload and interpretive chaos.

Rather than 15 independent decision-makers, the team operates within a shared interpretive framework.

A principle-led game model can serve as the mechanism through which this shared framework is constructed.

Game Models in a Rugby Pathway System

Within a state pathway program spanning ages 13–18, the primary objective is cumulative development, not short-term tactical perfection.

Our game model is built around themes in each area of the game. For example, in defence:

- Set first
- Connect with teammates
- Win collisions

These themes define what "good" looks like. They shape session design, guide preview and review discussions, and inform selection conversations.

Importantly, these are not rigid phase-based scripts. They are broad principles.

In attack, a central principle is to "fill the field". By maintaining width, players create clearer pictures. If the defence is narrow, space exists at the edges. If the defence spreads, interior or backfield space may emerge. How that space is exploited is not prescribed. Players are encouraged to recognise opportunities and apply skill solutions appropriate to the picture in front of them.

This distinction is critical. The model shapes perception. It does not dictate behaviour.

Across age groups, these principles are layered progressively. Younger players learn what to look for. Older players develop deeper tactical nuance, timing, and manipulation of defensive structures. Because the language remains consistent across stages, learning compounds rather than resets.

For coaching groups — often assembled from diverse backgrounds — the model provides a shared lens. Particularly in short campaign environments, this alignment accelerates cohesion among staff and consistency in messaging to players.

Game Model as Shared Mental Model

Prediction and Coordination

When players share principles, prediction improves. A defender who understands the value of connection anticipates inside support. An attacker who understands width principles anticipates space emerging in predictable patterns.

Shared mental models reduce the need for constant communication because players anticipate each other's actions (Eccles & Tenenbaum, 2004). In rugby, where milliseconds matter, this anticipatory alignment enhances execution under pressure.

Cue Recognition and Perception–Action Coupling

The model functions as an attentional scaffold. It shapes what players look for.

Questions such as:

- Is our defensive line set?
- Are we connected?
- Do we have players across the field able to attack space?

Guide perception. Over time, repeated exposure strengthens perception–action coupling — the relationship between recognised cues and behavioural responses. Rather than reacting randomly, players respond to structured interpretations of the game.

Ashford, Abraham, and Poolton (2020) emphasise that communal language in invasion sports enhances decision-making by aligning players' interpretations of game information. Shared terminology reduces ambiguity and accelerates understanding.

Accelerating Individual Development: Building Game IQ

While shared mental models are often discussed at team level, their individual developmental impact is arguably even more significant in pathway systems.

Game IQ — a term widely used but rarely defined — reflects the ability to interpret game situations, anticipate outcomes, and select appropriate responses.

For developing athletes, especially those in decision-dense roles (halfback, fly-half, inside centre, defensive organiser), the ability to recognise and process information accurately is a key performance differentiator.

A shared game model accelerates this development through several mechanisms.

1. Reducing Cognitive Overload

Young players often struggle not because they lack effort or skill, but because they lack interpretive structure. Rugby presents overwhelming informational complexity.

A principle-led model reduces this complexity into manageable themes. Instead of processing every movement, players learn to prioritise specific cues:

- Is the defence narrow?
- Is our defensive line connected?
- Is space outside or inside?

This attentional narrowing is not restrictive — it is developmental. Over time, as understanding deepens, players can layer additional nuance onto these foundations (consistent with scaffolding principles in skill acquisition research).

2. Strengthening Perception–Action Coupling

Ashford, Abraham, and Poolton (2020) argue that communal language supports decision-making by aligning interpretation of situational information. In rugby terms, repeated exposure to shared principles strengthens the link between recognising cues and executing appropriate responses.

For example:

Recognising narrow defence → widening play.
Recognising disconnection → attacking seams.
Recognising poor defensive set → increasing tempo.

This structured reinforcement accelerates learning. Players in game-driving roles begin to anticipate patterns earlier and with greater confidence.

3. Developing Tactical Literacy

Aspiring professional athletes require more than physical capacity; they require tactical literacy.

A consistent shared model allows players to:

- Understand cause and effect within phase play.
- Anticipate likely defensive adjustments.
- Organise teammates with clarity.
- Reflect more effectively post-game.

In pathway systems, this cognitive acceleration may be one of the most valuable outcomes of a shared framework. It compresses experiential learning. Rather than relying solely on accumulated matches, players develop structured interpretive skill.

Shared Mental Models and Team Cohesion

Team cohesion has been consistently linked to performance outcomes across sport (Carron et al., 2002). Importantly, cohesion is not purely social — it is also cognitive. Teams do not perform better simply because they like each other; they perform better because they understand each other.

In high-performance rugby, moments of transition, launch plays, and multi-phase attack require rapid alignment under pressure. When players share an understanding of priorities, cues, and expected responses, coordination becomes implicit rather than negotiated. This reduces hesitation, prevents duplication of effort, and limits internal friction. In this sense, cohesion is expressed through coordinated action, not just interpersonal connection.

Shared mental models provide this common ground. They create a shared vocabulary ("fold", "reload", "space wide"), and shared expectations about how teammates will respond in specific situations. Communication becomes shorter and more precise. Feedback becomes less personal and more task-focused. Disagreements shift from opinion-based to principle-based — players can ask, "Is that aligned with our model?" rather than "Why did you do that?"

This cognitive alignment is particularly important in newly formed pathway squads, where athletes come from different clubs, schools, and coaching systems. Structured SMM development likely functions as a catalyst — shortening the time required for players to move from individual performers to coordinated unit members.

For pathway programs, this acceleration matters. Limited training time, frequent squad turnover, and high competitive demands mean cohesion cannot be left to chance. A clearly articulated and consistently reinforced shared mental model provides a mechanism for building functional cohesion quickly — not by forcing social bonding, but by aligning perception, decision-making, and action.

Critical Considerations

The benefits of shared mental models must be balanced with awareness of their limitations.

Oversimplification

No model can fully capture the complexity of rugby. There is a risk that coaches interpret every outcome through the model's lens, overlooking contextual nuance.

If reviews consistently default to model-based explanations, alternative insights may be missed.

Perceptual Narrowing

Because the model shapes attention, it may also constrain it. Players may prioritise cues that fit the framework while ignoring unexpected opportunities.

The very mechanism that accelerates learning can, if unchecked, limit adaptability.

Selection Bias

In pathway systems, game models often inform selection criteria. If the model privileges specific physical or stylistic profiles, players who could thrive under alternative tactical frameworks may be overlooked.

Aligning models with broadly transferable principles — such as moving forward, creating space, maintaining connection — mitigates this. Principles should allow multiple expressions across different player profiles.

Cause or Reflection?

It remains possible that shared mental models reflect cohesive, well-led teams rather than cause performance improvements directly. A highly cohesive, high-performing team would likely develop shared mental models organically, which in turn enhance coordination and team cognition. However, this paper proposes in developmental and newly assembled groups, intentionally constructing shared cognitive frameworks appears to accelerate this process.

Reframing the Game Model

The distinction between scaffold and script is critical.

A game model should function as a scaffold — something that organises thinking and guides perception — not as a script that dictates behaviour in every situation. Rugby is too dynamic, too context-dependent, and too opponent-driven to be solved by rigid prescription. When a model becomes a script, players begin searching for the “correct play” rather than reading what is in front of them. Decision-making narrows. Creativity declines.

In contrast, when treated as shared cognition, a game model guides attention rather than behaviour. It helps players recognise cues, understand priorities, and anticipate teammates’ responses — but it still leaves room for individual expression and situational adaptation. The model frames the problem; the player solves it.

In practical terms, a well-functioning game model should:

- Guide perception without prescribing fixed solutions.
- Provide developmental structure without limiting expression.
- Offer common language without becoming dogma.
- Evolve with performance evidence rather than resist it.

When treated as doctrine, a model narrows both coaching and playing behaviours. When treated as a shared mental framework, it enables faster alignment, clearer feedback, and more intelligent autonomy. For pathway environments in particular, the objective is not to produce compliant players who execute patterns. It is to develop adaptable decision-makers who can operate within structure while responding intelligently to game complexity.

Practical Implications for Pathway Leaders

1. Introduce principles progressively and revisit them annually.

Principles must be introduced appropriately depending on the playing groups relevant age and stage. This allows for stacking of knowledge as a player progresses through a program rather than a steep initial learning curve that may stall development.

2. Use shared language consistently across teams to avoid cognitive reset.

Consistent language allows for deeper understanding over time. Players can achieve a deeper understanding of what is expected of them both technically and tactically and allows for consistent messaging from coaching and support staff.

3. Invest deliberately in developing decision-makers within the framework.

Use of an integrated game model alone won't optimally develop game IQ in developing players. However use of a game model with consistent language can be a useful tool to frame coaching conversations with players in decision making positions and accelerate enhanced game understanding.

4. Regularly evaluate whether the model predicts real game situations.

Regular critical assessment is required to ensure game model remains an accurate representation of game realities. Without such, changes in game trends may be missed and team performance can suffer.

5. Audit selection processes for unintended model bias.

Ensure due consideration for different perceptions of talent while selecting teams. Going unchecked, coaches can drift towards selecting players based on fit of the particular game model rather than the most talented players or players with long term potential – a crucial aspect for a player development pathway.

6. Encourage creative problem-solving within principled boundaries.

Introduction of a game model must be principle based rather than being overly prescriptive. Thus allowing room for freedom and creativity in skill selection and execution to capitalise on identified tactical opportunities.

Conclusion

In multi-team rugby pathway systems, a principle-led game model supported by shared language can function as a shared mental model that enhances coordination, accelerates cohesion, supports player transition, and — importantly — accelerates individual cognitive development.

For aspiring athletes, particularly those in game-driving positions, this structured cognitive scaffolding may significantly enhance tactical literacy and leadership growth. This is particularly important at elite levels, where differences in physical capacity often narrow making speed and quality of decision making an increasingly decisive performance differentiator.

However, alignment to a game model must not become rigidity. Oversimplification, perceptual narrowing, and selection bias are genuine risks.

The effectiveness of a game model lies not in its precision, but in its flexibility — and in the quality of the shared understanding it creates.

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