



Cognitive load and decision-making in youth soccer training: Implications for player development

 **Arman Sargsyan**

Independent Researcher Los Angeles, California, United States.

Email: sargsyan98arman@gmail.com



ABSTRACT

Article History

Received: 20 January 2026

Revised: 2 March 2026

Accepted: 17 March 2026

Published: 30 March 2026

Keywords

Cognitive load
Decision-making
Ecological dynamics
Perceptual–cognitive skills
Player development
Skill acquisition
Small-sided games
Youth soccer.

Football performance is dependent upon quick decision making, perceptual abilities, and cognition. In many youth football development programs, however, coaches fail to fully address the cognitive demands placed on players during games. This article uses principles of cognitive load theory, motor learning, and sport psychology to discuss how cognitive load affects decision-making in youth players. Different coaching practices either increase or decrease cognitive load, depending on how a coach structure activities. Tips on how coaches can achieve a desirable cognitive load are presented. Youth football coaches should strive to find the balance that allows players to achieve their maximum learning potential without overloading their working memory. Ideal cognitive load promotes quicker and smarter decision making on the field, increased confidence, and long-term player development. The purpose of this article is to explore how Cognitive Load Theory (CLT) can be applied to youth soccer instruction with the goal of expediting decision-making skills and producing more effective long-term athlete development. A conceptual/integrative review design was utilized and informed by cognitive load theory, ecological dynamics, and motor learning and skill acquisition literature. This analysis discussed how various task constraints impact working memory capacity, perception–action coupling, and schema development in youth players. However, small-sided games and constraint-led practices that are appropriately challenging allow for germane cognitive processing and the development of flexible decision-making abilities. Methodically manipulating space, numbers, rules, and the coach’s teaching behavior favors anticipation and scanning behaviors while developing efficient first-touches and reducing anxiety during game-play.

Contribution/Originality: This study contributes to the existing literature by integrating Cognitive Load Theory with applied youth soccer training design. The major contribution of this paper is showing how progressive manipulation of task constraints can be used to best enhance decision-making development and long-term perceptual–cognitive skill learning.

1. INTRODUCTION

Football is an intricate sport that demands players to take in large amounts of information quickly. During a game, players need to: Scan the field, understand their options, anticipate opponents’ actions, and execute the correct technique—all while under time pressure. All of these things take up space in a player’s working memory and can become quite mentally demanding, especially in youth athletes.

Questions often arise about how much coaches should emphasize repetitive physical and technical training in youth soccer development. On one hand, coaches’ risk overwhelming players if they design sessions with too many

constraints that require thinking and decision-making. On the other hand, coaches may under-load players' cognition when conducting overly simple activities that focus purely on player technique (Balling, 2013).

It is important for coaches to understand how cognition affects players' learning and game performance. Cognitive load theory can be applied to better understand how too much, or too little cognitive demand can affect players' development. The purpose of this article is to review how coaches can use cognitive load principles to positively impact their players' learning.

Training athletes to make better decisions is a common theme throughout coaching conversations. Over the past decade, football has become faster, more tactically intricate, and teams now press high up the pitch and defend more narrowly. This means that players must identify information quickly, understand it, and react in small fractions of time. For many players, particularly youth players, this can be asking too much (Beilock & Carr, 2001).

Too many teams assume that playing games is enough for young athletes to improve decision-making. In reality, coaches must be deliberate about how they implement design elements in training to allow players to feel comfortable under challenging conditions. If players do not experience this in training, they will often react slowly, make poor decisions, hesitate during game-play, and lose confidence when playing at higher standards.

Understanding cognitive load allows coaches to design training sessions that help young athletes cope with the speed and pressurized feelings they get when making decisions during games.

Today's game model is faster paced than ever before with less space and high levels of pressure. With so much information surrounding players for only fractions of a second, they must make quick decisions. Players are facing higher technical and tactical demands at younger ages than ever. Decision-making has become even more crucial in players being able to distinguish themselves and unlock their potential to succeed at higher levels. The physical and technical aspects are always going to be of importance but it all starts with the player's brain (Cumming, 2013).

Coaches these days still rely on cookie-cutter drill after drill and reward or punish their players for results. However, inside a real game scenario thinks could not be further from cognitive simple. A player can have great technique killing a drill but have no idea what to do with the ball during a game.

2. LITERATURE REVIEW

2.1. Cognitive Load Theory

Cognitive load refers to the amount of mental effort being used in the working memory. Cognitive load theory breaks down into three types of load: Intrinsic, extraneous, and germane load.

Tasks that are complex in nature have a high intrinsic cognitive load. Sports, especially soccer, have a high intrinsic load as they are open and unpredictable.

When coaches eliminate unnecessary constraints and structure their sessions clearly, they can reduce the amount of extraneous cognitive load. Cognitive load that contributes to a player's learning is referred to as germane load (Paas, Renkl, & Sweller, 2003).

One helpful theoretical framework to approach the concept of cognitive load is Cognitive Load Theory (CLT). CLT describes that working memory can only process a certain amount of information at a time. If instructional design allows learners to absorb information most related to the task or concept being taught, learning is more likely to take place. Applying this framework to soccer, athletes must perceive space around them, predict movement of opponents and teammates, coordinate motor responses, and execute game decisions. When there is too much information-processing required, performance suffers (Sweller, 2011).

Examples of intrinsic cognitive load during a game of soccer can include interpreting numeric advantage, identifying passing opportunities, and tracking their relation to nearby teammates. Extraneous load would look like random coach instruction during a game or not understanding the instructions of a drill. Extraneous load takes up space in working memory that can instead be used to process information related to intrinsic load. Germane load is the mental effort required to form or adapt schemas. Ideally, in youth soccer players, we would want to lower

extraneous load as much as possible while maintaining the desired intrinsic load that would allow players to create/update schemas related to the game (Sweller, 2011).

2.2. Decision Making

Decision making is something that coaches commonly assess when watching players. The better players see the game and make quick, proper decisions the better they will play. Elite youth players have been shown to have better perception and decision-making skills than their less skilled counterparts (Roca, Williams, & Ford, 2012).

These skills can only improve when players are put under cognitive stress during training that is similar to game-like situations.

Small-sided games and game sense-style activities have been proven to create high levels of perception and decision-making opportunities for players.

2.3. Fear of Failure

High cognitive loads can also affect players psychologically. If youth players are constantly placed under cognitive stress during training because the tasks are too difficult, they may.

- Lose confidence.
- Develop a fear of failure.
- Become less intrinsically motivated to play soccer.

Sport psychology principles show that players need to feel like they can succeed when playing soccer. By allowing players to make the right decisions and work under optimal cognitive load, coaches can help athletes feel confident and improve their game understanding.

Recent developments in sport science have linked skilled performance to perception–action coupling principles. Essentially, evidence is mounting that skilled players are not simply reacting faster than their opponents, but that they pick up cues and anticipate what will happen before the action actually takes place. This lends further credit to the hypothesis that successful performance comes from working smart, rather than working hard. Secondly, when developing youth athletes, there is also evidence to suggest that poor cognitive demands can hinder player development. Tasks that are too tightly constrained give players no opportunity to explore the game or work out solutions for themselves.

On the other hand, if games are constantly thrown in at too many players with too many responsibilities, they may become cognitively overloaded and players won't be able to hold all of the information in their working memory. Players learn when the games they play are representative of the game itself but constrained enough to match their needs. Lastly, work in sport psychology has shown that players who feel like they understand the game and know what to do are higher in motivation and self-confidence (Gould & Carson, 2008).

3. METHODOLOGY/CONCEPTUAL FRAMEWORK

The methodology of this research project is conceptual. The author conducted a literature review of other works related to cognition and incorporated coaching experience to develop a better understanding of how coaches can manipulate cognitive load during training sessions.

The literature review examined cognitive load theory, sport psychology, and soccer coaching. Using the information from the literature review, the author developed a framework to discuss how different coaching practices can affect a player's cognition.

The underpinning philosophy to this study is essentially the fusion between cognitive load theory and applied soccer training. Rather than looking at cognitive load as something that restricts us as coaches, we can also look at ways in which it can be altered by how we manipulate the task, rules, space and player relationship with each other. Using the diagram above we can control how players experience learning conditions.

Developmentally speaking we should look to gradually increase the cognitive load based on player perceptual and psychological maturity. Put simply young players should have fewer decisions to make that primarily allow them to practice scanning and simple decision making while older players can be gradually exposed to more complex tactical constraints. Doing so allows players to feel more confident and learn more efficiently (Chow, Davids, Button, & Renshaw, 2016).

Cognitively speaking coaches should also slowly back away as teachers. Yes, we set up the task and provide guidelines but on game-based learning we should allow players to figure things out rather than babysit with our voices. Allowing players to cognitively engage will happen naturally if we allow players to be player centered.

Decision making cannot be isolated from perception–action coupling. Players can only choose decisions based on environmental information and perceive their surroundings while moving. Therefore, it is unlikely players are choosing from a prescribed list of decisions. Instead, players react to affordances in the environment including space/time availability and defender location. Training tasks that do not replicate informational demands will provide little learning transfer to game situations.

Adequate cognitive load allows players to be aware of their surroundings, anticipate what may occur next, and take the necessary action with the least amount of wasted movement. High cognitive demands decrease visual search and increase reaction time which could lead to players freezing up or making technical mistakes (Davids, Araújo, Vilar, Renshaw, & Pinder, 2013). Figure 1 illustrates the relationship between under-load, optimal cognitive load, and overload, demonstrating how balanced cognitive demands enhance decision-making, confidence, and skill development, while excessive or insufficient load negatively affects performance.

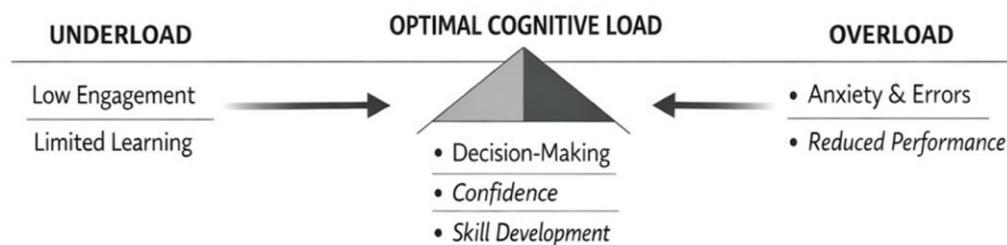


Figure 1. Conceptual model of cognitive load in youth soccer training.

4. ANALYSIS: COGNITIVE LOAD IN YOUTH SOCCER TRAINING

4.1. Under-Load vs. Overload

When coaches have youth players participate in activities that require little thinking, such as repetitive passing drills, they under-load players' cognition. These types of drills will certainly help players with their passing technique, but do not allow them to think about the game.

If coaches want players to learn how to improve their decision making, they must create training environments that encourage players to perceive the game.

Some coaches might be afraid of steering players too far in the opposite direction by overwhelming them with complicated training activities. If there are too many constraints in a small-sided game or players do not understand the coach's instructions, this can overload player's cognition (Clemente, Wong, Martins, & Mendes, 2014).

Players might freeze up, become anxious, make careless mistakes, and take longer to learn because they are being overloading with information.

4.2. Just Right Cognitive Load

When players are under a desirable cognitive load, they will perceive the game, make quick decisions, and execute. This article primarily focuses on small-sided games because they provide high amounts of perception and action opportunity.

Small-sided games with a low number of constraints are great at providing players with a good cognitive load. For example, a 4v4 game with a restricted playing area and teams must keep possession while only shooting in one direction at the goal (Hill-Haas, Dawson, Impellizzeri, & Coutts, 2011).

This small-sided game increases the intrinsic cognitive load but does not overwhelm players with too many constraints. Players are still able to scan the field, recognize when they are closing down by opponents, and find the best passing options.

Central midfielders typically experience the highest cognitive load during games. They are in almost every play and are responsible for getting the ball up field and maintaining possession.

4.3. Cognitive Load by Age Groups

All coaches should be mindful of their young player’s cognitive development when constructing training sessions. Coaches could under-load cognition by not giving players enough information to think about during a game-based drill. If players are 6 years old, coaches should not expect them to play a 11v11 game with the same complexity as teenage players. Figure 2 illustrates the cyclical relationship between perception, decision-making, execution, and feedback, demonstrating how players continuously scan their environment, choose actions, perform movements, and learn through evaluation.

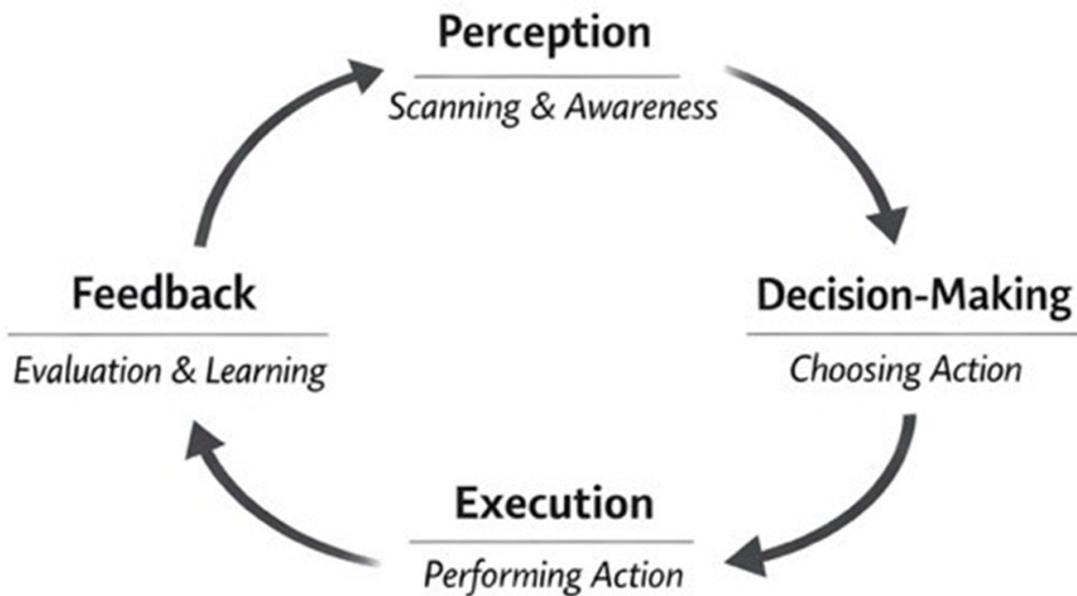


Figure 2. Perception–Decision–Execution–Feedback cycle in youth soccer performance.

Training in environments which include variability and opposition create more cognitive demand than simple drills. Small sided possession games with restrictions lead players to frequently process information about space, teammates and opponents etc. They also create decisions which must be executed quickly and adaptations to changing scenarios.

Error and Learning: Learning theory tells us that humans learn significantly through their mistakes. Allowing players to make mistakes and then discuss those mistakes in a non-threatening environment allows them to develop better decision strategies and anticipate opposing players reactions. Coercing players with threats and fear when mistakes are made causes players to play smaller and limits their decision-making capabilities.

Position Specific Insight: Studies have shown that the position of central midfield has the highest decision density. Designing small sided games that emulate the types of decisions a central midfielder must make allows players to develop position specific intelligence. Figure 3 illustrates a constraint-based small-sided game design in

which player positioning, directional movement, and passing options are structured to manipulate cognitive load and enhance decision-making under realistic match conditions.

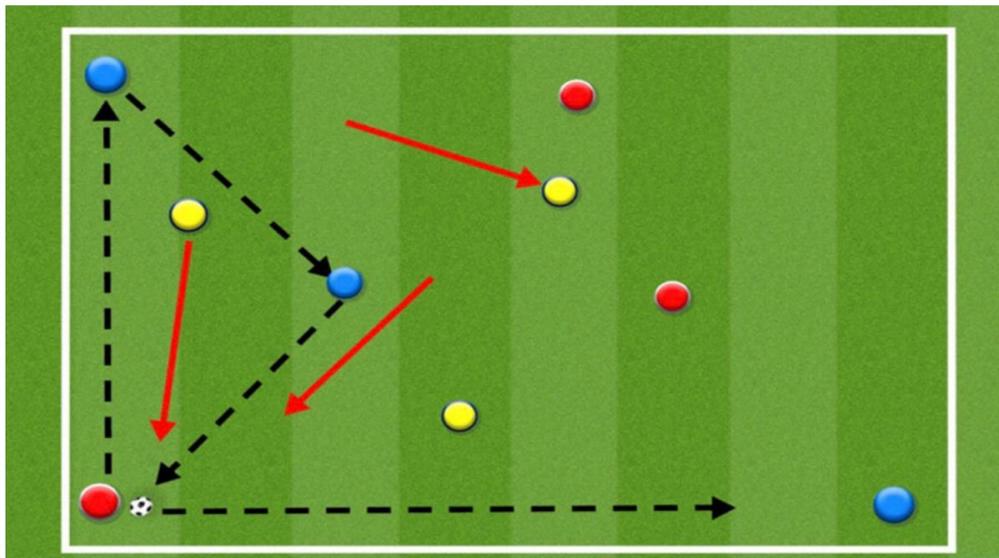


Figure 3. Constraint-Based Small-Sided game design for enhancing decision-Making in soccer.

4.3.1. Diagram Description (How to Draw it)

- Square grid (12x12m).
- 6-9 players on inside.

4.3.2. Cognitive Rule

- Coach calls or signals a color.
- 2 different color group of 3 players plays against 1 group of 3 color about 2-3 min till they lose the ball and after group attacking and defending players are changing their roles.

Player in possession must:

1. Scan before receiving.
2. Create triangles, be fast and one touch as possible.
3. Defending players press high.

First touch quality is closely linked to cognitive processing speed and decision-making efficiency in youth soccer.

First touch provides time and space when you don't have to correct your ball control. When players learn how to use an anticipatory first touch, players can move into their next move quicker without thinking as much about what they have to do. So if they are scanning, know where their player/teams want/passing them the ball, they can shape their body before they receive the ball to where they want to go next. This reduces their cognitive load while playing the game. They don't have to scan the field again to know what to do because they already know once they receive the ball. Their perception of the game and action are one fluid movement, with their decisions coming naturally.

Over time, the combination of refined first touch and fast cognitive processing contributes significantly to long-term player development.

If players are thinking quicker while under pressure, they will develop better schemas making it easier for them to play without having to think as much. They can recognize patterns quicker, and everything on the field becomes simpler because they know how to react to all situations because they've seen it all before. As the game speeds up at higher levels, and there is less time and space to think, players who have learned how to connect their first touch

with their goal will excel. They will be better under pressure, not lose confidence as easily, and know how to play "smart" football.

Common interventions to modulate cognitive load during soccer practice include Small-Sided Games (SSGs). Manipulating team/player numbers and space are common strategies that lead to greater participation rates and exposure to authentic perceptual information retained from the match environment. SSGs allow players to make numerous decisions, scan their environment, and adapt to various game situations, which fosters players' perceptual-cognitive skill development.

Modifying task constraints can alter cognitive demands placed on players during training. Constraints can be altered to increase cognitive demand by decreasing space (increasing time pressure and decision-making complexity) or can be manipulated to temporarily decrease intrinsic load by providing players with a numerical advantage. Unlike coaches who try to simplify games by providing excessive instruction to players, carefully manipulating constraints allows coaches to adjust cognitive load while maintaining environmental realism and player engagement.

While SSGs appear to provide coaches with the tools to eliciting tactical awareness and promote efficient decision-making, they can still impose a high cognitive load if not structured carefully (e.g., too many constraints and/or lack of clear game objectives).

4.3.3. Cognitive Skills Developed

- Scanning.
- Selective attention.
- Decision speed.
- Working memory.
- Pressing.
- First touch and technique.

4.3.4. Long-Term Cognitive Development and Transfer to Match Performance

Communication, or coaching behavior, can also impact cognitive load during practice. Instruction-based coaching that focuses on corrections and verbal cuing can contribute to extraneous load, particularly with young athletes whose working memory may be easily taxed. If players are asked to recall multiple tactical cues while executing complex motor tasks they will have more split attention, which can decrease their performance and learning.

Coaching behaviors that foster implicit learning and guided discovery can allow players to focus on the learning environment and fully process the task at hand. Simplifying verbal information and allowing players to problem solve can shift a player's cognitive load to germane load, promoting player understanding, confidence, and adaptability.

4.3.5. Duration and Transfer Effects

The task constraints involved in creating appropriate learning problems will likely facilitate improved decision-making performance during training but how will these improvements carry over to match-play performance in the long-term? As players are exposed more frequently to easier decision-making problems (Recognizing offensive and defensive patterns and knowing when to pass or dribble), they should develop automated schemas that allow them to make quicker decisions with less cognitive effort.

Most notably, players should show improvements in their first touch and pre-orientation movements as they learn to scan the environment prior to the ball reaching them. These players offload some of the cognitive information they need to process during ball contact before the ball even reaches them. Therefore, we should see

players make faster decisions to pass, better orient their bodies after receiving possession, and have increased awareness of players around them. Decision-making under pressure should also improve with practice as scanning before ball contact should reduce intrinsic load and allow players to focus on other dimensions of play.

Encouraging players to scan the field before receiving the ball may take time and patience; this process is why coaches should use training exercises that replicate game-like information rather than have players repetitively dribble down a lane. While the latter may lessen cognitive load, it does not promote long-term learning transfer as players are not required to make decisions. Instead, coaches should incorporate small-sided games, positional or rule constraints to expose players to similar information they would experience during a game.

The effects of training under these constraints will benefit players in the long-term, especially when the game becomes more physically and mentally demanding during adolescence. Scanning the field and making quick decisions during training should prepare players for moments where the game slows down for them. Players who have been developing cognitively during youth should be better able to handle pressure as they are used to dealing with similar situations. Another long-term effect would be players' ability to train under different systems and play various positions. Instead of playing a certain way because that is how they have been coached to play, these players can solve problems on the field because they have been given the opportunity to do so.

4.3.6. Pointers for Educating Football Intelligence

Lastly, football intelligence is not developed in a vacuum. Every action a coach does or does not do will influence how players perceive their coach, teammates, and the learning environment. Players look towards their coach to understand how they should react to success, failure, and even learning from their mistakes. If coaches create an environment where mistakes are punted as negative outcomes, players will be afraid to solve problems or look for alternative solutions. This idea goes hand in hand with my previous blog post on building a player's mental toughness. By creating a safe environment where mistakes are information to learn from, players will be more intrinsically motivated and cognitively engaged.

5. DISCUSSION

Youth coaches should take into consideration how different coaching styles and practices effect their player's cognition. As shown in the analysis, coaches who overload or under-load players' cognition are hurting their players' learning and development.

Ideally, coaches should apply the principles of cognitive load theory to their coaching style. This can be accomplished by simplifying rules during small-sided games, creating game-based training activities, and allowing players to find their own solutions to problems.

Although coaches should not be constantly lecturing players during small-sided games, they should give instructions when needed. If coaches feel it is necessary to provide information to players during a game, they should communicate before and after the play as not to disrupt players' thoughts.

Cognition also plays a huge role in players' confidence. As stated before, if players feel like they are going to make a poor decision, they may fearfully withhold from becoming fully involved during a game. Coaches should help players feel comfortable when making decisions by allowing them to make the right decisions during training.

One takeaway from this framework analysis is that cognitive load isn't bad, bad itself. If athletes are mentally overloaded by well-designed challenges they will grow. If they are set up to fail by poorly designed challenges, they will become unsure of themselves and not perform to their ability. Coaches who control cognitive load with intention can allow athletes to have longer, healthier careers. We as coaches need to adapt and change from our normal X's and O's drills. We need to allow our athletes to be creative, make decisions, and think about what they are doing. If we can change coach education to focus on these principals we could see an increase in development

throughout youth systems. We could possibly create some consistency in what is considered best practice and decrease some of the useless performance statistics we hear today.

If soccer is all about making decisions, shouldn't we approach training differently than simply drilling technique until it becomes automatic? Cognitive Load Theory offers several important implications for coaches working with youth players. In order to better prepare them for the unpredictable nature of games, coaches should create environments that mimic the perceptual and cognitive demands athletes will experience under pressure.

Managing Cognitive Load Can Improve Game Performance & Player Development Coaches should do their best to accommodate the cognitive load that players experience so they aren't overwhelmed when it's game time. Designing practice games and drills that resemble the speed and unpredictability of real game situations can help players learn how to cope with situations that happen during competition. High-quality coaching should also create a learning environment that allows players to develop skills like playing smart, maintaining emotional control, and making them better players over time.

6. PRACTICAL IMPLICATIONS FOR COACHES

Here are some basic takeaways for coaches to apply to their training sessions.

- Use small-sided games that require players to think about the game.
- Do not overwhelm players with too many rules and constraints.
- Allow players to problem solve.
- Keep instructions short and simple.
- Do not hesitate to provide guidance if players seem overwhelmed.
- Check in on your players' mental and psychological state during games.

Figure 4 indicates the contrast between traditional training methods and cognitive training approaches, demonstrating how game-based, player-centered, and variable situations promote higher decision-making demands compared to isolated, coach-centered drills.

Traditional Training	Cognitive Training
• <i>Isolated Drills</i>	• <i>Game-Based Exercises</i>
• <i>Low Decision-Making</i>	• <i>High Decision-Making</i>
• <i>Coach-Centered</i>	• <i>Player-Centered</i>
• <i>Predictable Patterns</i>	• <i>Variable Situations</i>

Figure 4. Traditional vs. cognitive training models in youth soccer.

There are several ways a coach can add or subtract cognitive load. Some simple ways are with task constraints such as number of players, area of play, and amount of playing time. Small-sided games with small games Ids allow players to keep scanning and making decisions without becoming overloaded.

Coaches can wait to give feedback until after the game or activity is over. When players are engaged in a game or activity, they are regulating themselves and correcting their own mistakes. This does not mean coaches should not provide any feedback. After small-sided games or activities, players can talk for a minute about what they did.

Fostering an environment where players understand that mistakes are part of the learning process will allow them to have more cognitive load during activities. When players are not afraid to make mistakes, they will take on more challenges and learn more from their experiences which will allow for more transfer of learning (Light, 2013).

Cognitive load also impacts psychological aspects of performance such as confidence and motivation. Players who are consistently overloaded may start to experience increased anxiety on the court, fear of failure, or hesitations. This can also lead to a decrease in their confidence and motivation, creating a cycle of poor decision-making.

On the other hand, allowing players to operate within an optimal cognitive load during training promotes confidence, a desire for autonomy, and a sense of mastery. Players who are regularly exposed to problems they can solve (with slight challenges) will perform with more confidence and mental toughness. This can also lead to long-term athlete development and retention (Coutts & Coullard, 2013).

7. COGNITIVE PROCESS SKILLS: FIRST TOUCH, SCANNING AND ANTICIPATION

7.1. First Touch

Teaching first touch without considering its perceptual and decision-making components is common in youth soccer. Players are expected to perform some technical action with their feet without having to process information.

First touch, however, may be one of the most cognitively dense actions in soccer. Before receiving the ball players must scan their environment, read opponent positioning, anticipate pressure, and choose a solution that allows them to keep playing (Ericsson, 2004).

Successful first touches actually buy time, open up angles, and limit the number of decisions players must make after they receive the ball. Poor touches put pressure on players after the touch as they must recover, reassess, and act quickly, often leading to panic or rushed decisions.

Teaching “first touch” in isolation from these pressures only makes players better at first touch mechanics, not first touch as a cognitive tool. Instead, coaches can use first touch as a cognitive bridge by forcing players to perceive information, anticipate pressure, and perform an action all within the context of a game-based scenario (Ericsson, 2018).

7.2. Scanning

Scanning is the act of surveying the environment before receiving the ball. Studies have shown that elite players scan more and earlier, than less skilled players.

Elite players process this information before they receive the ball, allowing them to make decisions before rather than after they receive possession.

Scanning allows players to spread out decision-making over time. This reduces extraneous cognitive load and allows players to play with more freedom after they receive the ball.

Scanning isn't instinctive for young players. Most will keep their eyes on the ball or coach as long as possible, limiting their ability to read space, teammates, and defenders.

If players don't scan, they are forced to make quick decisions after they receive the ball. These overloads working memory and typically leads to poor performance.

Rather than reminding players to keep their head up, coaches can set up games where players must scan to find playable options. Restrictions like limited touches or dribble direction encourage players to look up and find a teammate in space, which often results in better decision-making (Williams & Ford, 2013).

7.3. Anticipation

Anticipation is the cognitive process of predicting what happens next. Experienced players will often “see” the run a teammate makes before they make it, or “know” that a defender is going to apply pressure before it happens.

With high anticipation skills players are able to position themselves correctly and act confidently without having to look for every hint of information.

When players can anticipate aspects of the game, cognitive load is lowered because players aren't searching for information; they already know what to expect based on previous experiences.

Young players lack the ability to anticipate because they have never experienced enough similar game situations to make meaningful predictions. Linear drills fail to improve anticipation skills because they don't replicate game-like situations (Roca et al., 2012).

Small-sided games with constrained styles of play will force players to encounter the same relative situations over and over. As players gain familiarity with these tactical problems, their level of anticipation should improve until certain actions become automated.

7.4. Learning from Errors

Learning is a cognitive process. When players make mistakes, they are given the opportunity to reflect on their performance, evaluate hypotheses, and solve problems. Over time players' brains develop efficient functions that help them make better decisions.

In youth soccer letting players make mistakes is often frowned upon. Coaches will publicly criticize players, correct them after every touch, or even punish players for making the wrong decision.

This type of coaching may increase extraneous cognitive load by making players afraid of making mistakes. When players are afraid to make mistakes, they stop trying to solve problems.

Players that aren't afraid to make mistakes will make more decisions with less cognitive processing. These players are typically more creative, but they also make more mistakes.

Creating an environment where players can learn from their mistakes helps them discover solutions to their problems. By slowing down feedback, asking questions, and allowing players to discuss their thought process with teammates coaches can drastically reduce the chance of players tuning out while still allowing players to correct their mistakes.

7.5. Positional Differences

Not all positions are created equally in terms of cognitive load. Central midfield players face the most decisions per minute because they are involved in every phase of play.

Building plays out of the back forces midfielders to scan and track opposing players while staying aware of their own positional rotation options. Defending transitions require midfielders to track ball-carriers and adjust their positioning based on offensive movement.

The best way to overload players in their position is to simulate match-like conditions as closely as possible in small-sided games. Overload games in the center of the field or positional rondos are great ways to increase your midfielders' cognitive load without requiring excessive running.

Training players without context doesn't replicate the decision-making demands of a real game. Coaches should think about how their training environments better prepare players for match-related cognition.

7.6. Player Development

Decision-making is something that players carry with them for their entire lives. How players are developed from a young age will impact how comfortable they are making decisions later on.

If you throw players into situations with too much cognitive load, they may become anxious on the field or choose to quit playing soccer altogether. All players have a threshold for how much information they can process, and forcing them to constantly operate at that threshold can be mentally exhausting.

Players need time to develop these decision-making skills. By progressively adding complexity to your training sessions, you can improve players' skills while keeping cognitive load manageable (Côté, Baker, & Abernethy, 2007).

As players get older their perception and decision-making abilities mature as well, meaning you can slightly increase the cognitive demand of your sessions every year.

7.7. Coach Education

Most coaching education courses spend little to no time teaching coaches how players learn. Coaches are taught about tactics and told to design training sessions that allow players to practice these tactics.

Coaches learn about physical and mental attributes but are never taught how to improve them in a training environment.

Learning how players perceive, think, and decide allows coaches to apply cognitive load theory to their coaching.

Coaches want to develop intelligent players, which means they need to be intelligent themselves about how players learn and develop on the field.

8. CONCLUSION

Cognitive load should not be overlooked by coaches who want their players to be smart on the field. Too much or too little cognition during training can limit a player's development and cause psychological problems. If coaches want their players to improve their decision making, they must find a good balance that will allow players to achieve their learning potential.

This investigation provides further support for the need to consider cognitive development as a primary goal of youth soccer development programs. Decision-making, anticipation, and game intelligence do not improve when they are placed under cognitive load.

In terms of future work, research should continue to be done finding empirical ways to measure cognitive load in game-like situations. Wearable tech, video segmentation, and training tools that track decisions may assist in this discovery.

My final point is this, if we want smarter players, we must change our coaching style. Allowing players to think using game-like, periodized training will develop more confident players that can adapt to the ever-changing game of football.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Transparency: The author states that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

REFERENCES

- Balling, M. (2013). *GameSense coaching forever changed how I look at small-sided games*. United States: Coaching Science Today.
- Beilock, S. L., & Carr, T. H. (2001). On the fragility of skilled performance: What governs choking under pressure? *Journal of Experimental Psychology: General*, 130(4), 701–725. <https://psycnet.apa.org/doi/10.1037/0096-3445.130.4.701>
- Chow, J. Y., Davids, K., Button, C., & Renshaw, I. (2016). *Nonlinear pedagogy in skill ac-quisition*. United Kingdom: Routledge.
- Clemente, F. M., Wong, D. P., Martins, F. M. L., & Mendes, R. S. (2014). Acute effects of the number of players and scoring method on physiological, physical, and technical performance in small-sided soccer games. *Research in Sports Medicine*, 22(4), 380-397. <https://doi.org/10.1080/15438627.2014.951761>
- Côté, J., Baker, J., & Abernethy, B. (2007). *Practice and play in the development of sport ex-pertise*. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology*. United States: Wiley.
- Coutts, A. J., & Coullard, B. (2013). Stop... children are not little adults: Developing activi-ty-specific training programs for youth players. *NSCA Journal*, 35(3), 11–14.

- Cumming, J. (2013). *Cognitive development stages in youth soccer players*. United States: ASN The Magazine.
- Davids, K., Araújo, D., Vilar, L., Renshaw, I., & Pinder, R. (2013). An ecological dynamics approach to skill acquisition: Implications for development of talent in sport. *Talent Development and Excellence*, 5(1), 21-34.
- Ericsson, K. A. (2004). Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. *Academic Medicine*, 79(10), S70-S81.
- Ericsson, K. A. (2018). Deliberate practice and expert performance. *Current Directions in Psychological Science*, 27(4), 245-250.
- Gould, D., & Carson, S. (2008). Life skills development through sport: Current status and future directions. *International Review of Sport and Exercise Psychology*, 1(1), 58-78. <https://doi.org/10.1080/17509840701834573>
- Hill-Haas, S. V., Dawson, B., Impellizzeri, F. M., & Coutts, A. J. (2011). Physiology of small-sided games training in football: A systematic review. *Sports Medicine*, 41(3), 199-220. <https://doi.org/10.2165/11539740-000000000-00000>
- Light, R. L. (2013). *Game sense: Pedagogy for performance, participation and enjoyment*. UK: Routledge.
- Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist*, 38(1), 1-4. https://doi.org/10.1207/S15326985EP3801_1
- Roca, A., Williams, A. M., & Ford, P. R. (2012). Developmental activities and the acquisition of superior anticipation and decision making in soccer players. *Journal of Sports Sciences*, 30(15), 1643-1652. <https://doi.org/10.1080/02640414.2012.701761>
- Sweller, J. (2011). Cognitive load theory. *Psychology of Learning and Motivation*, 55, 37-76.
- Williams, A. M., & Ford, P. R. (2013). Game intelligence in sport. *Journal of Sport & Exercise Psychology*, 35(5), 527-541.

Views and opinions expressed in this article are the views and opinions of the author(s), Journal of Sports Research shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.