



**Intelligence in Football:  
Conceptualizations, Developmental  
Methodologies and Behaviors**

A phenomenological investigation

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## **Abstract**

**Aim:** In elite football (also known as soccer), practitioners are in constant pursuit of understanding essential performance parameters and how they can be developed. As every executed football action is governed by a decision, a player's ability to make intelligent decisions during play is vitally important for success. This concept of a player's "football intelligence" is complex and at times ambiguous for practitioners both at the elite and sub-elite level. The present work aims to provide some clarity regarding the phenomena of intelligence in football.

**Methods:** Semi-structured interviews with 8 well-merited professional coaches from multiple countries were conducted, asking them three main questions; how do they conceptualize football intelligence? What developmental methodologies do they implement to address football intelligence, and in what practical behaviors do players manifest football intelligence? Responses were transcribed verbatim and analyzed using qualitative research methods.

**Results:** The results give insight into what can be summarized as components of football intelligence, such as concepts of anticipation and information processing. Additionally, a number of different methodologies including functional training and pedagogical approaches to develop football intelligence emerged. Furthermore, some specific behaviors performed by intelligent players, such as information-seeking actions, were exemplified.

**Conclusions:** Based on the results, a conceptual framework for better understanding the phenomena and potentially improving practical interactions with football intelligence are presented and discussed. Finally, practical recommendations for coaches and players are suggested, along with suggestions for further academic research.

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Bilaga 1 Käll- och litteratursökning

# 1 Introduction

The game of football is characterized by a complex and dynamic setting, where players must constantly make and execute decisions while simultaneously managing tactical frameworks, technical proficiency, physical/motor actions and a sustainable psychological state. Coaches and sport philosophers have previously divided sport performance into four categories; technical, tactical, physiological and psychological. Successful players must be consistently competent in reference to these categories, and coaches are constantly evaluating players to pinpoint which category must be improved. In this process lies a further complexity; some categories can be more easily evaluated than others. Many of a player's physical components of performance for example, can be quantified through various technological measures such as total distance covered, and the assessment of a player's technical parameters can be at least be aided by the analysis of statistics like passing and dribbling success rates (da Mota, Thiengo, Gimenses & Bradley, 2016).

In relation to the tactical and psychological performance categories however, a player's performance is often arbitrarily and very subjectively analyzed. Within the tactical category of performance, rests a broad and complex decision-making process. Since each technical and physical action in football is governed by a decision, the decision-making process is of supreme value for player performance, and a player's ability to consistently make intelligent decisions on the pitch is a prerequisite for successfully implementing other skills. For example, a player's physical capacity to accelerate quickly is of little or no value if they fail to recognize how and when to accelerate. Equally, a player's technical ability to dribble with the ball is of little to no value if they fail to recognize when dribbling with the ball is a viable solution. A player's ability to make good and situationally appropriate decisions to help solve given on-pitch problems has been conceptualized as “game intelligence” (Pill, 2018).

## 1.1 *Previous research*

Game intelligence is a very sought-after quality, that has been the focal point of a number of academic projects in the past. Some studies have looked to explore the link between game intelligence and pedagogy (Kelly, 2017; Croad & Vinson, 2018), whereas other have qualitatively investigated correlations between game intelligence and creativity, finding that coaches mostly associate game intelligence to rationality and problem solving in decision

making (Leso, Dias, Ferreira, Gama, Couceiro, 2017). Game intelligence in team sports has also been ambitiously explored quantitatively (Lennartsson, Lidström & Lindberg, 2015). Additionally, studies have presented ideas surrounding contextual intelligence in football, using a contextual intelligence questionnaire to evaluate three dimensions; anticipatory intelligence, tactical intelligence and competitive intelligence (Ruiz, Garcia, Palomo, Navia & Minano, 2014) which are related to further in this work. A potential explanation to why some football players are more successful than others has been presented as linked with the development of cognitive executive functions, such as working memory, which are suggested to be the more general cognitive abilities associated with game intelligence (Vestberg, Reinebo, Maurex, Ingvar & Petrovic 2017). The concept of game intelligence has also been conceptualized and researched from the points of tactical creativity, or tactical decision making, including one study where concepts of breadth of attention and inattention blindness were investigated in terms of their prevalence and implications in team sports (Furley & Memmert, 2007). The same authors presented another study that has suggested that domain-general working memory capacity is not associated with creativity in a soccer-specific creativity task (Furley & Memmert, 2015), somewhat contradictory to the suggestions of Vestberg et al. (2017).

Naturally, some studies and theories which focus on development methodologies of game intelligence in team sports and physical education have been presented. Many can be summarized as “game-based” approaches such as TGFU: Teaching Games for Understanding (Bunker & Thorpe, 1982), and the Game Sense approach (Den Duyn, 1997) which advocate teaching with a focus on understanding the game at a deeper level. An additional theory regarding the development of game intelligence is classified as a “non-linear” approach, which can be summarized as a learner-centered style in which the environment and task are manipulated to facilitate learning and skill acquisition (Chow, Davids, Button & Renshaw 2016). In terms of practical behaviors performed by football players to facilitate intelligent solutions, frequency of environmental exploration through information-seeking behaviors expressed by rotation of the head has been linked to successful on-ball performance in football (McGuckian, Cole, Jordet, Chalkley & Pepping, 2018).

## 2 Background

Despite the concept of game intelligence being a topic of interest for researchers both in sports broadly and football in particular, there remains some discrepancy regarding the phenomenon. More specifically, there remains discrepancy in its conceptualization, definition, practical manifestations and practical development methodologies. Previous phenomenological research that had coaches conceptualize decision-making, a central element in the process of manifesting game intelligence in football, yielded significant variation ranging from quite simple and fragmented conceptualizations to more sophisticated and comprehensive conceptualizations within the football coaching community (O'Connor, Wardak, Goodyear, Larkin & Williams, 2018). It can be hypothesized that the concept of game intelligence in football may exhibit a similar phenomenon of variation due to its complexity and depth.

While a majority of elite coaches likely want to work with players that possess high degrees of game intelligence, and therefore often evaluate players based on their degree of game intelligence, it is unclear if the coaches have a clear and unanimous definition of the concept. No previous research to the knowledge of the author of this work has conducted phenomenological interview style research concerning game intelligence in football with an international and elite level scope. Research tracking elite coaches' current views on what game intelligence is and how it is developed, would provide practitioners like other coaches, players, and football federations with invaluable insight which may function as a foundation for further developed methodologies to improve their respective interactions with game intelligence in football. Furthermore, it is of interest to analyze to what degree coaches' definition of game intelligence is unanimous, as potential discrepancy would mean more diffuse criteria for players looking to develop their game intelligence to strive for, and a baseline problem making intellectual discussions surrounding game intelligence difficult within the coach's field of work. Additionally, it is of further interest to analyze elite coaches' conceptualizations and methodologies surrounding game intelligence from an international perspective, as this may provide a number of different approaches to the phenomenon as influenced by footballing history, and cultural differences. Results may also be of benefit for the academic world, as conceptualizations from the practical world may provide researchers with suggestions sub-topics to further investigate from a scientific and more theoretical perspective. Based on the results, recommendations for football practitioners to facilitate the

development of intelligent players are presented for practical implementation. Results of this work may also present themes closely related to academic concepts, suggesting that they be the focal point of future studies. Through a series of interviews with elite coaches working in professional and international settings within men's and women's football, this work will aim to assess the coaching community's current conceptualizations of game intelligence, as well as tracking their practical methodologies surrounding its development and their interpretations of intelligent player actions.

### **3 Purpose & Research Question**

The primary purpose of this work is to record and analyze elite football coaches' conceptualizations regarding the phenomena of intelligence in football (hereby referred to as football intelligence) and their methodological approaches used to develop this football intelligence. Furthermore, this study will attempt to present a clearer and practically useful explanation of what constitutes football intelligence than is currently available. The purpose can be distilled to a research question; how do elite football coaches conceptualize intelligence in football, and what methods do they use to develop it? Answering questions such as what football intelligence is, how intelligence manifests itself practically and how it can be best developed can be beneficial insight for a plethora of sub-groupings in the football world as previously discussed.

## **4 Method**

### ***4.1 Research method***

The phenomenological research approach aims to track the lived experience of a particular group and ultimately to describe the nature of a phenomena (Creswell, 2013). In the present study, the group is composed of elite football coaches and the phenomena investigated in football intelligence. The research method also exhibits characteristics similar to those discussed in grounded theory, as the focus is to obtain an understanding of the football intelligence phenomena and how it manifests itself in real life. It is assumed that this method can generate a theory (Hassmén & Hassmén, 2008) which this work to some extent manages.

In order to best address the research questions at hand, the qualitative research method of spoken interviews has been utilized. Semi-structured interviews were selected to allow the

interviewee to speak rather free-flowingly, explaining their conceptualizations of football intelligence. Semi-structured interviews allow for a high degree of flexibility and opportunity for clarification. Spoken interviews may also have an advantage over written interviews as it can be assumed that football coaches more regularly must verbally communicate their conceptualizations to players and media for example, as opposed to communicating in written form, and therefore will be more comfortable with the task which likely will contribute to qualitative data of a higher quality.

#### **4.1.1 Qualitative analysis**

After the data collection process, the transcribed data has been analyzed using a constant comparison method described in grounded theory and is used to develop categories and themes from the data (Hassmén & Hassmén, 2008). These categories are constantly compared to each other, searching for emerging similarities and differences. Upon distilling the qualitative data into categories and themes, a conceptual framework can be created and presented.

#### **4.2 Procedure**

Upon selecting the topic of football intelligence for further investigation, previous research was searched for in scientific databases such as Discovery, using search words like; game intelligence, football, soccer, tactical creativity and more. The structure and proposed method of this study was presented at a seminar, where peer suggestions were taken into account. Upon selecting the interview research method, inquiries regarding an interest to participate in the study were sent to over 40 coaches. After a period of rejections and non-responses, 8 male senior professional coaches aged 31-60 with an average of 16.5 years of coaching experience were chosen as final participants using a purposive sampling method which can be summarized as selecting participants that were deemed to be of particular interest for the purpose of the study (Hassmén & Hassmén, 2008). These participating coaches were strategically chosen as they had experience in various roles, are from various backgrounds, and work both on the men's and women's side of the game. In this case, senior professional coaches were defined as coaches working with senior level (i.e. adults) in the top tier of the domestic league pyramid or national team. All but 2 of the participating coaches have obtained a UEFA PRO (or other continental federation equivalent) coaching license. Upon expressing their interest and being selected for participation, the coach was contacted via email and asked to respond with general background information such as current club, age,

nationality, professional player and coaching history, as well as educational history with the assurance that these details would not be publicly published. The response to this email serves as confirmation of participation in the study, and a time for an interview was agreed upon. The interviewee was also informed regarding the objectives and their role in the current study. Participants were also informed that they will be answering anonymously, and that their names will not be published in the study. The interview layout was pilot tested on multiple occasions, and questions were distilled to three main questions: 1) *what is intelligence in football?* 2) *How do you work practically to help develop football intelligence with players?* 3) *What practical behaviors do intelligent players perform?* Emphasis was placed on coaches to exemplify and clarify their thoughts. The interview was conducted and recorded using QuickTime 10.5 over the phone, and transcribed verbatim. All interviews, with the exception of those conducted with Swedish coaches, were conducted and transcribed in English.

### **4.3 Ethics statement**

The conducted research consciously adheres to the European Code of Conduct for Research Integrity as presented by ALLEA, incorporating principles of reliability, honesty, respect and accountability (ALLEA, 2017). With respect to the coaches' careers and in accordance with academic conduct, personal information such as names or current club affiliations will not be published in the study.

## **5 Results**

The series of 8 interviews resulted in a number of interesting themes surrounding the phenomenon of football intelligence. As the interview consisted of three main questions, regarding conceptualizing football intelligence ([5.1](#)), the developmental methodologies ([5.2](#)) used by coaches, and the practical behaviors performed by intelligent players ([5.3](#)) respectively, the results have been grouped into three corresponding categories after undergoing constant comparison. Under each category the corresponding interview question is presented, followed by a series of themes and citations from the interviewed coaches. Under the presented theme and citation, some commentary and practical examples are provided.

## **5.1 Conceptualizations and components of football intelligence**

Interview question: *“Intelligence in football... what is it in your opinion?”*

### **a) Anticipation of play (anticipation)**

*“the capacity to think before receiving, to anticipate in some way the play” - Coach 1*

When asked what intelligence in football is, Coach 1 suggested that it is linked with the ability to anticipate the play; reading its course and acting proactively, rather than reacting to the occurrences and acting reactively. In relation to a football-specific situation, this could mean to anticipate the play and know that repositioning yourself slightly to the left, will allow you to receive the ball with space to your right, making a switch of play more easily executed. A previous study presented a strand of intelligence called “anticipatory intelligence” which refers to the ability to “anticipate the actions of my opponents”. This factor is related to the intuition, the signal capture or the prior oversight to the performance.” (Ruiz et. al, 2014)

*“the ability to recognize what the situation looks like leads to better decisions. Predicting what situation is arising is important in that aspect, and that’s where the pattern-recognition ability comes into play” - Coach 8*

As Coach 8 remarks, the concept of anticipation can also be linked to the concept of pattern-recognition. Pattern-recognition ability is likely an important part of the anticipation process as it would allow the player to identify an emerging pattern, for example the structure of their team in relation to the structure of the opponents team, and allow them to anticipate how that pattern would develop during play and subsequently what opportunities the situation affords them with. In relation to tactical ability, a sort of football-pattern recognition would be a precursor to a successful decision and execution, in the sense that the player would first need to recognize what situation they are in, before proceeding to select and perform the tactically desired decision. In the present work, this component is labelled as “anticipation” for categorization purposes.

### **b) Prioritize perception (prioritized perception)**

*“finding a priority information in that jungle where you have a lot of information... that’s maybe the real intelligence that is in unconscious level that you really learn to understand what is priority and.... what is like important information in every particular situation” - Coach 5*

With multiple of the interviewed coaches expressing the need for players to “scan” their environment with the hopes of perceiving essential information for good decision making, Coach 5 brought the need for a player to prioritize their perceptive process to light. Coach 5 implies that in a football situation, a player is faced with a multitude of informational stimuli, and that football intelligent players have learned what type or groups of stimuli are of more importance than others for making successful, advantageous decisions. For example, when a player is about to receive the ball, the position of the closest opponent, the structure of the attacking team and the spaces available would be likely (besides the ball itself) be some of the more relevant information for making a successful decision, as opposed to the informational stimuli of someone in the stands which does not benefit the decision making process. The coach also eluded to the fact that learning what stimuli to prioritize can and should be positionally specific; the striker learns what specific information he should look for when picking a spot to aim his shot at, and the defender learns what specific information to perceive when defending one-on-one situations for example. In this regard, coaching plays a potentially monumental role. As the process of arranging the stimuli into an accurate hierarchy is likely a difficult task for a player, a coach can aid this process by suggesting what stimuli is relevant to identify, such as the position of the opposite offensive midfielder for a defensive midfielder about to receive the ball. Additionally, and perhaps more profoundly, the coach could provide the player with a clarification of his task in the given situation and allow the player himself to discover what information he needs to perceive to ensure he can fulfil the task at hand. For example, if the defensive midfield is to receive the ball from one side and knows that his task is to switch the field of play, he will after some repetition likely have discovered that scanning the opposite side of the pitch and identifying a free player to pass to is essential information to complete his task. However, there is an important balance for coaches regarding the degree of their restrictive instructions, as too rigid and specific instructions seem to have a negative effect on tactical solutions and decision making (Furley & Memmert, 2007). In the present work, this component is labelled as “prioritize perception” for categorization purposes.

**c) Processing speeds (speed of process)**

*“obviously it becomes a speed of finding solutions, speed of preparing for solutions”*

*- Coach 5*

Coach 5 points out the importance of a type of processing speed when faced with problematic situations in football. At the elite level, when many players have reached a certain proficiency in appropriate decision-making ability, those who can process perceived information and make appropriate decisions faster than others will have a natural advantage. In the present work, this component is labelled as “speed of process” for categorization purposes.

**d) Play in relation to situation and context (relation to situation)**

*“to know... as a player what you need to do depending on the situation you are (in) or the situation the game is in that moment, so for example depending on the minute of the game, depending on... the result, this could be the situation (that affects)*

*which decision you need to make” - Coach 6*

Coach 6 also points out the relevance of the specific situation in the game, and its relation to football intelligence. This is of particular interest as it highlights the enormous complexity of decision making in football. If a player has the ball on the offensive half and identifies the opportunity to pass to a teammate in a position of good offensive potential, they would be inclined to “risk” the pass being intercepted as the potential for a good scoring chance is present. By most coaches, this would be a praised decision in most scenarios... but if it is the last minute of a game in which you are leading by one goal, most coaches would like to see the player make sure to retain possession of the ball at all costs, not risking giving it away for what is not a sure goal. Given the need for adapted decision making in relation to the unique strategic requirements in a specific in-game scenario, coaches should be cautious of teaching players that certain decisions are always “correct”. In reference to the contextual intelligence study, this point can be conceptualized as *tactical intelligence* “I usually choose the appropriate technique for a certain competition moment). It refers to the competence to make the correct solutions in those situations the athlete encounters.” (Ruiz et. al., 2014)

In the present work, this component is labelled as “relation to situation” for categorization purposes.

**e) Play in relation to skillset (relation to skillset)**

*“the intelligent players, are the ones that adapt their skills to the demands of the game. So they have the capacity to understand that if you are not a fast player, they don’t try to beat the opponent through the pace. But if they are good through... good passing skills... they try to find these jobs where they can have a good impact through their passing skills” - Coach 1*

Coach 1 also implies that intelligence in football is linked to the ability to play in relation to the players own, unique skillset. Coaches often design complex tactical systems based upon the characteristics of their players, and players who act out-of-character often only worsen the possibilities for collective team success. Players should process information through a lens of how their ability can be applied to the situation and make decisions rooted in manifesting their own personal strengths while simultaneously benefitting the team. In the present work, this component is labelled as “relation to skillset” for categorization purposes.

**f) Understand the environment (understand environment)**

*“ability to recognize the outer conditions and being able to adapt to them.... so intelligent player is mostly a player who is aware of what’s going on on the pitch... he can recognize the surroundings and he is able to understand what solution, in the specific scenario, will be the best to bring the advantage for him and for the team” - Coach 4*

Coach 4 voiced the importance of a player to recognize and adapt to the conditions during the game. With the goal of creating an advantageous situation for the team, a player should perceive the variables and process their significance, and finally adapt their actions, whether with the ball such as a pass that switches play to create a numerical advantage, or without the ball such as a positional adjustment to attract attention from defending opponents, subsequently bringing the advantage of more time for their teammate with the ball. In the

present work, this component is labelled as “understand environment” for categorization purposes.

**g) Decision-making (decision-making)**

*“intelligence, in a very basic statement is the ability to make as many decisions that affect positive outcomes in different moments in the game... make good decisions consistently” - coach 7*

Coach 7 conceptualized intelligence in football as interrelated with decision making, whilst taking into account the specific context of the game that the decision is made in, similar to the component of playing in relation to the match situation as discussed previously. The coach also suggests that since it's difficult to gauge the players actual internal decision, decision making ability is better analyzed with the perspective of the outcome, and the players ability to produce positive outcomes consistently in a variety of game situations. This would encompass an execution sub-phase, meaning that the outcome is also heavily influenced by the technical execution (which may be seen as the practical manifestation of the made decision), which adds to the complexity of analyzing a player's decision-making ability. In the present work, this component is labelled as “decision-making” for categorization purposes.

**h) Evaluating and learning (evaluating and learning)**

*“in my experience the most intelligent players are the ones who learn the fastest... what solution works in what kind of situation, and why it worked also” - Coach 2*

Coach 2 notes that intelligent players often seem to obtain and manifest appropriate knowledge at a more rapid rate than others. Upon experiencing a football situation, these players are able to evaluate their decision and its outcome, in relation to the perspective of the technical action, the game situation as a whole, the positions of opponents and so on. Once knowledge of a situation is obtained, it can be generalized and abstractly considered to be applied to situations of similar yet different conditions. In the present work, this component is labelled as “evaluation and learning” for categorization purposes.

## **5.2 Developmental methodologies of football intelligence**

Interview question: *“How do you work practically to help develop football intelligence with players?”*

### **a) Recreated game situations; recognizing and understanding (game situations)**

*“in training we need to create an environment that is as specific as possible to how we want to play. Intensity, rules such as offside, patterns and behaviors should be incorporated as they are those we want to have transfer to the matches we play.” -*

*Coach 8*

In regard to methodologies used by coaches to facilitate the development of intelligent players, Coach 8 advocated the necessity of recreating game situations. This recreated environment should aim to encompass many of the same attributes as the match itself, and desired actions and behaviors should manifest as much as possible. Adding to the authenticity of the environment, game rules such as offside should be active as these variables are essential to recognize and base decisions and actions upon. Coach 8 also touches on a concept of “transfer” from the training environment to the match environment. This would be in line with a suggestion that players in training environment occupy the roles that they will have during matches, which is presented later on. Viewing this method through the lens of the pattern-recognition phenomena, may help understand this reasoning; if coaches want players to anticipate and act in situations based upon the recognition of developing patterns such as positions of teammates, these patterns should be replicated in the training environment often, and in as much similarity to the game environment as possible.

*“what we try to do is to help them (the players) understand the game, and that means to understand how the opponent is playing, where are the weakness of each opponent, where are the spaces, where are the advantages, how to create superiorities in certain zones of the pitch especially and what the keys to solving it are. If needed, guiding them on how it can be solved.” Coach 1*

Above, another coach advocates the recreation of game situations as a developmental method for intelligence in football, with the perspective of understanding. When game situations are

recreated in training, focus is put on aiding players to be cognizant of the opposing teams' tactical strategies and its strengths and weaknesses. Practically, this means helping players identify what spaces have a high probability of arising, and what advantages and relating superiorities can be beneficially exploited. In this process, the coach suggests that players should be given the opportunity to discover themselves, and that coaches should help players by guiding them in this process as oppose to simply giving them solutions as this would likely limit the players opportunity to manifest a creative solution of their own accord. This phenomenon is similar to theories of “discovery learning” suggesting that discovering information on one's own makes it more relatable and applicable to problem-solving (Bruner, 1961). In the present work, this method is labelled as “game situations” for categorization purposes.

**b) Functional training with correct roles and locations (role-based functional training)**

*“I don't think you can do this (develop game intelligence) individually (isolated) for example... you need game situations to do defensive part as well.” Coach 2*

Coach 2 advocates the necessity of functional training programs to help develop intelligent players, in line with the argument that isolated training does not offer the complexity and same demands as functional or game-like situations present. The coach also expresses that intelligence in football is not something that can generally be manifested at the individual dimension, as an individual's intelligent decisions must be made in relation to other players and collective structures. In this sense there is a need to develop game intelligence, both in offensive and in defensive actions, through training that presents a player with the need to behave in relation to other teammates and opponents.

*“it's important to train in a way that's close to the match, and preferably in the correct roles and with those behaviors. This means you are often in the position and in the spaces as you will be on the pitch.” - Coach 3*

As another coach adds above, when training in a functional manner, players should be occupying the roles and positions that closely resembles those that they will be expected to

perform during matches. This would likely be an obvious concept when playing games such as 7 vs 7 in training, but could also be a concept that is applied to exercises such as possession play. In the present work, this method is labelled as “role-based functional training” for categorization purposes.

**c) Provide players with tools to understand environment, and execute appropriate decisions in a functional environment (Tool-providing functional training)**

*“to make intelligent players we should give them appropriate tools, so they can know as much as possible and react on their own based on their own experience and potential” - Coach 4*

Coach 4 expresses that a way of viewing the coach's role in facilitating more intelligent players is to provide them with the appropriate tools to solve situations in functional environments. The coach advocates that training should be played out in an environment of intensity which demands a high degree of concentration, and that is functional in the sense that it demands players to be aware of factors such as teammates, opponents, the ball and spaces. In addition, a degree of autonomy is suggested, allowing a player to be in full control of their decision-making process as opposed to role-based functional training which is stricter in the sense of positions and player roles. As the coach explains, the information-gathering behavior of scanning the play should be conceptualized as a tool that aids in the manifestation of intelligent actions in the play, as discussed later in this work. In the present work, this method is labelled as “tool-providing functional training” for categorization purposes.

**d) Exercise that create the necessity to make decisions related to a problem.  
Manipulate variables to make specific situation/concept appear more often.  
(Problem-based exercises)**

*“it has to be situation of decision making, decision making, decision making... where the players have to think about what they have to see, it's not just playing 6 versus 6 and let's go. No, we need to create a problem inside the game, and the players think about this problem... what this problem is doing is (creating) the concept that we*

*want to work, is appearing more times. And then the players if they make the right decisions will be able to solve this problem that you are creating inside the game. So the players have to think about how to solve different problems that are being present” - Coach 6*

In regard to how to develop intelligent players, coach 6 is clear that creating exercises that incorporate high and frequent demands of decision making is necessary. The coach explains a process of creating a specific problem within the exercise. This created problem facilitates cognitive activity and players must constantly find and implement solutions. Variables such as pitch area, number of players, and additional rules of play can be manipulated to create the need for certain solutions, which would represent the concept that the coaches wish to develop with the players. For example, if a coach wants to work with a players ability to shield the ball from an opponent, playing a game with equal number of players offensively and no limitation on the number of touches a player can take would likely cause the situations where a player needs to shield the ball to occur often. In the present work, this method is labelled as “problem-based exercises” for categorization purposes.

**e) Ask questions, promote reflections (strategic questioning)**

*“I think that the way of teaching players and ask them to look at themselves and ask them to evaluate themselves I think it should be a day in day out work instead of... a little component in a program or something like that.” - Coach 2*

Another method to develop more intelligent players used by coaches seems to be the use of strategic questioning, and promotion of reflections from players. As Coach 2 details above, asking players to adopt a reflective stance on their actions and decisions should be a daily practice.

*“I ask what were you thinking when this and this happened? How did you prepare, for what option you prepared as a priority? So really questions, questions, questions, and with this of course reminders” - Coach 5*

Coach 5 seems to work in a similar way, strategically posing questions regarding the players decision making processes, and stimulating a self-reflective ability which is regarded as one of the characteristics of intelligent players, as discussed further later on in this work. In addition to strategic questions, Coach 5 will use reminders for players, including reminders of tactical concepts or technical adjustments. In the present work, this method is labelled as “strategic questioning” for categorization purposes.

**f) Video analysis - experience from a different perspective (video analysis)**

*“I think it’s important to... get the knowledge by video, so I use a lot of video because I think it’s important for them to see the game situations from perspective.” - Coach 2*

According to coach 2, the use of analysis of video is a method of facilitating football intelligence, suggesting that videoed situations from training and matches can be seen afterwards and complement the players real time experience. Seeing the situation from another perspective, may help the player get a broader view of the play and has the advantage of being able to be replayed, and reanalyzed without the extreme time constraints of the real time situation. Additionally, discussions between the coach and player may be had in regard to the situation being watched together, stimulating further development of the players knowledge. The utility of video analysis as an aid to situational experience for players is reiterated by coach 5 in a citation below, where a three-step *experience, video analysis, and re-experience* process is outlined.

*“use the mistakes and good moments three times; so in the field, you experience it once, then after that from the video maybe you make another perception about the same situations because it's not emotional anymore, and third time, third time you try to correct it in the field the next Monday” - Coach 5*

As coach 5 explains, a player may have a different outlook on a situational experience after the fact not only due to the change of perspective provided by the video, but also since they are in a different emotional state. Coach 5 is also clear that the three-step *experience, video analysis, and re-experience* process can be applied to both advantageous

and disadvantageous situations, where advantageous decisions and actions would be validated during video analysis step, and attempted to be replicated in following sessions whereas disadvantages decisions would be discussed, and a new strategy would be suggested and attempted to be applied in the following session. In the present work, this method is labelled as “video analysis” for categorization purposes.

**g) Isolated first, progress to functional (Isolated training)**

*“it's like a learning process, perhaps in the beginning you may have to work more isolated and simply with training dolls (representing opponents) and learn to scan the situation, then you add more and more complexity to the exercises and finally reach a situation that's is very similar to the actual match... and the methodology to reach this actual match is in some sense to break it down more isolated first and then progress” - Coach 3*

While some of the interviewed coaches advocated the use of very functional and game-like environments in training to facilitate intelligent players, others spoke of the utility to isolated certain concepts. Coach 3 favors a methodology that revolves around a traditional learning process, which starts with a more isolated form of training and progresses to training with the same degree of complexity and demands as the match. As coach 7 outlined below, a similar principle of isolating a component of play can be used in the form of passing exercises. Given the specific tactical demands of the upcoming match, the coach will design a passing pattern to with the hopes of introducing the desired pattern of play to the players. The coach has conceptualized this as a form of sub-conscious programming for players and voices the utility of a more isolated exercise without opposing players as the technical motor actions with the ball should be the same. In the present work, this method is labelled as “isolated training” for categorization purposes.

*“I'll incorporate a passing pattern to support them team for the tactical strategy of the next game... it's a form of sub-conscious programming... without pressure first... since the technical and biomechanical action is the same” - Coach 7*

### **5.3 Behaviors of intelligent players**

Interview question: *“What practical behaviors do intelligent players perform?”*

#### **a) Information-seeking behaviors (Information-seeking behaviors)**

*“I think at players who scan a lot of times what’s going on around me, what’s going (on) close to me, what’s going (on) further away from me and have the full picture before they receive the ball...” - Coach 1*

A majority of the interviewed coaches expressed the importance “scanning” the environment, and it seems to be the practical behavior of intelligent players that first comes to mind for coaches. Scanning refers to an information-seeking behavior, where players turn their head to actively perceive information from their surroundings. Above, coach 1 accounts for how intelligent players constantly seek to perceive information from the on-pitch situation and develop an internal representation prior to receiving the ball, from which a decision can be based upon. As coach 6 explains below, information-seeking behaviors are vital to successful decision making, especially in coordination with the unique requirements of the game in the particular context. In the present work, this behavior is labelled as “Information-seeking behaviors” for categorization purposes.

*“if when you are playing football and you are just focused on where the ball is, then you will just receive the ball and you will not know what is happening in other spaces, then it will be very difficult to make the best decision. But if you have been looking around you and know what is happening in the field then... if you as well know what the game needs... then you can make a good decision.” - Coach 6*

These information-seeking behaviors are likely facilitated by the coaching methodologies like game situations, role-based functional training, problem-based exercises and tool-providing coaching.

#### **b) Details & timing (details & timing)**

*“to receive in the right moment, in the right space, to control the ball with the right leg, to create advantages for your teammates, I think that that’s a sign of intelligence.” - Coach 1*

Coach 1 regarded seemingly small yet essential behaviors like controlling the ball with the foot furthest from the pressing defenders as manifestations of intelligence. As the coach implies, minute details implemented by the player is decisive in the creation of advantages for the team as a whole. These advantages may subsequently lead to successful overall performance. With regards to receiving in the right moment, this suggests a sort of “timing of actions” that contribute to success. If for example a player is to receive the ball in an open space, moving into that space too early may attract attention from opponents who then close it down. Instead, the intelligent players “times” their movement and meet the ball in the space. Behaviors such as controlling with the correct foot may be automated through the isolated training and tool-providing methodologies, whereas aspects of timing actions and creating advantages may be developed in game situations, role-based functional training, strategic questioning, video analysis and problem-based exercises. In the present work, this behavior is labelled as “Details & timing” for categorization purposes.

**c) Self-reflect, re-experience situations (Self-reflection)**

*“intelligent players I think reflect on their decision-making process, and try to re-experience it and learn.” - Coach 5*

Coach 5 suggests that intelligent players self-reflect and consciously re-experience situations in attempts to learn from them more often than other players. This self-reflective interest may allow a player to better develop their football intelligence as it promotes re-experiencing situations and the variables involved, pondering alternative solutions and other tasks associated with decision making. This behavior is likely facilitated by a coach using the methodology of strategic questioning and video analysis. In the present work, this behavior is labelled as “self-reflection” for categorization purposes.

Likely, the results presented in the categories above influence each other and act in an interrelated manor. In table 1 below, these three categories are linked together.

Table 1. Demonstration of how the results of the qualitative data may be linked together, as certain methods promote certain behaviors, and subsequently incorporate certain sub-components.

**Methods, related behaviours, sub-components of football intelligence**

	Game-like						Isolated
<b>method</b>	Game situations	Role-based functional training	Tool-providing functional training	Problem-based exercises	strategic questioning	Video analysis	Isolated training
↓	↓	↓	↓	↓	↓	↓	↓
<b>player behaviour</b>	Information-seeking behaviours Details & timing	Information-seeking behaviours Details & timing	Information-seeking behaviours Details & timing	Information-seeking behaviours Details & timing Self-reflection	Details Self-reflection	Details Self-reflection	Details
↓	↓	↓	↓	↓	↓	↓	↓
<b>sub-component</b>	Anticipation Prioritise perception Speed of process Relation to situation Relation to skillset Understand environment Decision making	Anticipation Prioritise perception Speed of process Relation to situation Relation to skillset Understand environment Decision making	Anticipation Prioritise perception Speed of process Relation to situation Relation to skillset Understand environment Decision making	Anticipation Prioritise perception Speed of process Relation to situation Understand environment Decision making Evaluating and learning	Prioritise perception Relation to situation Relation to skillset Understand environment Decision making Evaluating and learning	Prioritise perception Speed of process Relation to skillset Understand environment Decision making Evaluating and learning	Prioritise perception Relation to situation Understand environment Evaluating and learning

## 6 Discussion

The aim of this work was to investigate the phenomena of intelligence in football. Semi-structured interviews with professional coaches have revealed a number of similar yet different conceptualizations of what constitutes intelligence in football, as well as tracking the coaches' methodological approaches to develop intelligent players. To summarize the results, coaches conceptualized football intelligence along 7 different themes. These themes encompass a player's ability to: use anticipation, prioritize perception, process quickly, play in relation to the situation, play in relation to their skillset, understand the environment and to make appropriate decisions. Coaches prefer to use the following methods to develop football intelligence: game situations, role-based functional training, tool-providing functional training, problem-based exercises, strategic questioning, video analysis and isolated training. Furthermore, the practical behaviors that intelligent players perform were identified as information-seeking behaviors, details and timing, and self-reflection. These results were

gleaned with the hopes of providing clarity to the complex phenomenon of football intelligence. Practitioners may benefit from these results as identifying the conceptualizations and developmental methods used by elite coaches as well as the manifestations of intelligence in football may provide them with insight and inspiration with regard to how they interact with the phenomenon on a daily basis.

### **6.1 Components of football intelligence**

The well-known “theory of multiple intelligences”, advocates dividing human intelligence into more specific domains rather than viewing intelligence in general terms (Gardner, 1983). Perhaps a similar method could be applied with utility to conceptualize football intelligence? The conceptual themes of intelligence in football as expressed by professional coaches, could be seen as the sub-components of more general components of football intelligence, perhaps providing a clearer and more structured framework for interactions with this phenomenon. Based on the results of this study, suggestions for such a conceptual framework is presented below in figure 1.

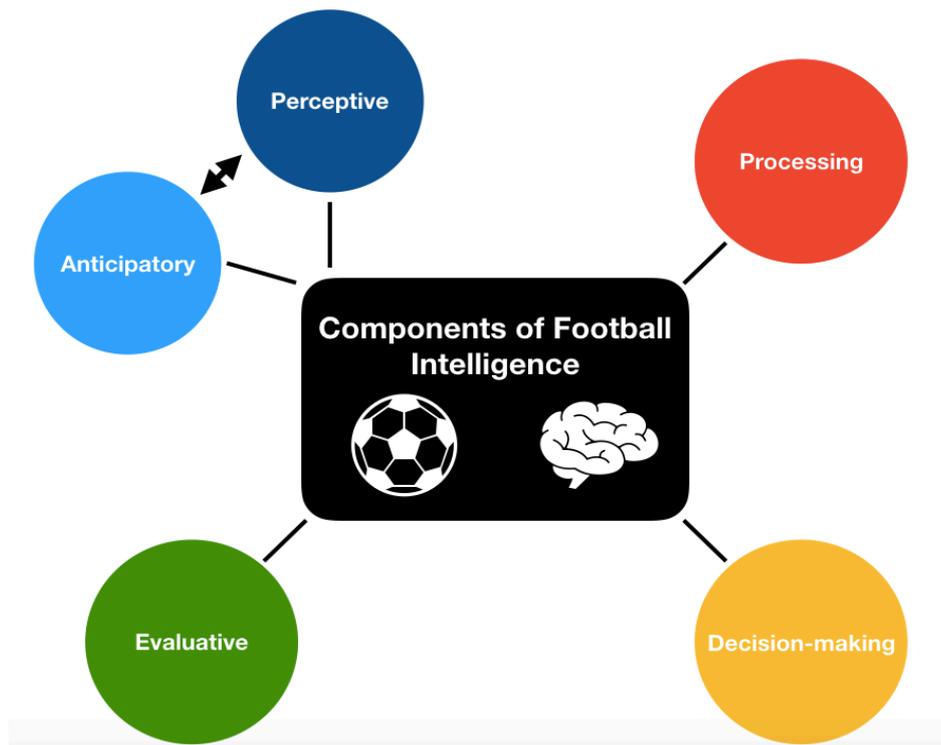


Figure 1. Above presents a conceptual framework of the football intelligence phenomenon. The adhering components are described in further detail below.

#### **Anticipatory ability & Perceptive ability**

Firstly, the ability to anticipate may be conceptualized as an essential component of football intelligence, that is working in close conjunction with the component of perceptive ability. Perceptive ability encompasses the players ability to perceive the situation, and the variables at hand. As a situation holds a large number of variables, some more relevant than others, the process of selecting and prioritizing stimuli becomes one essential for intelligent players. A player's ability to prioritize in what order and detail these variables should be perceived, is also a subcomponent of perceptive ability, and is a process likely aided by anticipatory ability. In terms of general variables to account for in a football situation, the ball, teammates, opponents and spaces are of interest. As with the anticipatory ability, the practical behavior most clearly associated with the perceptive ability components are the information-seeking behaviors performed by players. The interrelation of anticipation and perception has been the topic of studies before (Möller, 2000).

### **Processing ability**

Processing ability as a component of football intelligence would entail the information obtained through the anticipative and perceptive process being internally processed. Sub-Components of processing ability would be those described as a general speed of process, as well as the ability to process information in relation to the players individual skillset, and in relation to the situation that the game is in. The processing component has no clear link in relation the practical behaviors and is instead an internal process which lacks a physical manifestation.

### **Decision making (and execution) ability**

The decision-making component of football intelligence would be where a concrete football solution is produced (and executed) based upon the information gathered and processed in previous phases. Conceptually, the decision made is grounded in the perceived and processed information, and the execution can be considered as the practical manifestation of the decision. Herein lays some problematic complexity however, as a decision itself may be advantageous, yet the technical motor action supposed to execute it may be unsuccessful, making analysis of the decision-making component difficult. In relation to the behavioral themes discussed in this work, the decision making and execution component would manifest itself practically in regards to the specific details and “timing of actions” such as passing the ball to a certain foot of a teammate in a certain pace, as that would provide them with optimal advantage in a situation.

## Evaluative ability

The final component of football intelligence can be characterized as evaluative ability. This entails a player's ability to evaluate and subsequently learn from the situations they experienced when playing. This phenomenon would entail a transfer of knowledge, making it closely related to the concept of “generalization” ability in psychomotor learning study (Cratty & Noble, 2016). As outlined, the behavior of self-reflection would be closely linked to this component. Findings of a previous study have suggested that the process of metacognition (to think about the way one thinks in a situation) may be of utility for athletes (MacIntyre et al., 2014), and it is entirely possible that this concept could be a useful asset to a player's evaluative ability as a component of football intelligence.

Table 2. the table below further explains the findings of this work. Additionally, the components outlined about can be categorized into pre-execution, execution and post-execution phases, referring to the players physical interaction with the ball. Alternatively, the components can be viewed through their contribution to a process such as information gathering.

**Components and sub-components of Football Intelligence**

phase	Pre-execution						Execution	Post-execution
component	Anticipatory ability	Perceptive ability	Processing				Decision/execution	Evaluative ability
sub-component	Anticipation	Prioritise perception	Speed of process	Relation to situation	Relation to skillset	Understand environment	Decision making	Evaluating and learning
process	information gathering		information processing				decision-making / execution	evaluation

In conclusion, differentiating the phenomena of football intelligence into more specific components, may be a method of some utility for practitioners. This method may facilitate interactions of higher quality as it provides a more structured framework that can be used for the basis of interactions such as training regimes, and player analysis. There may be a

conceptual advantage to breaking down such a broad concept as football intelligence, as it would allow practitioners to more easily pinpoint areas during essential tasks like discussions and evaluations. For example, instead of coaches agreeing that Player A must improve his “game IQ”, they could be able to suggest in a more sophisticated manner that while he currently processes information well in relation to his skills and often makes good decisions in that regard, he would benefit from developing a better ability to process information in relation to the specific game scenario, and subsequently tailor a training program and pedagogical strategies to address this. An additional example that illustrates the importance of behaviors and performance components to work in coordination with each other, could be if Player B, who has a well-developed self-reflective behavior and evaluative ability, is able to discuss situations with her coaches who implement the method of strategic questioning, whereby the coaches could conclude that Player B is reading the play well (anticipatory ability) seeing what she should see (perceptive ability), processing information quickly and accurately in relation to her skills and the game scenario (processing ability) and is able suggest an appropriate decision (decision-making) yet is not able to practically manifest this decision consistently, leading coaches to identify that technical ability could be an area to focus the training regime upon. This may be related to the practice of differentiation, involving analytical processing each component of the whole process.

Greatly adding to the effectiveness of this approach would be the production of a series of tests that could validly and reliably gauge a player's respective component in an objective manner, which is no doubt a difficult task. For the time being, coaches will need to continue their subjective analysis of players football intelligence, a complex process that this paper suggests would be aided by the conceptual framework of differentiated components of intelligence in football. It should be clearly stated that this method is suggested solely due to its potentially practical utility for football practitioners, and not due to any scientific evidence that a football players action begins and cycles through the presented components as “steps”. As this work is based primarily upon the qualitative data accrued through semi-structured interviews with professional coaches who spoke of their practical interactions with the football intelligence phenomena, this work wishes to summarize these perspectives to the practical benefit of football practitioners, and does not wish to delve into the complex theoretical realm of the science behind intelligence, perception or football decision-making more than necessary. In fact, the author of this paper strongly advocates the necessity to always consider the practical utility of a model or theory for sport practitioners, as too many

theoretical models remain within the academic realm without being successfully practically applied, often because they contain too much information with too few suitable practical examples for practitioners to absorb and apply. The nature models and theories should be “pracademic”, combining the practical and academic realms. Hence, one should consider that experienced practitioners should at least be significantly involved in the production of academic works regarding their sport, if not writing the academic works themselves.

## 6.2 Developmental methodologies and behaviors

A number of developmental methodologies implemented by professional coaches were discussed. In summary, these methodologies ranged from training in a very game-like or functional environment, to beginning with isolated training. Additionally, more pedagogically oriented approaches like problem-based exercises, the posing of strategic questions to athletes and video analysis sessions were discussed. These methodologies are illustrated further in figure 2 below.

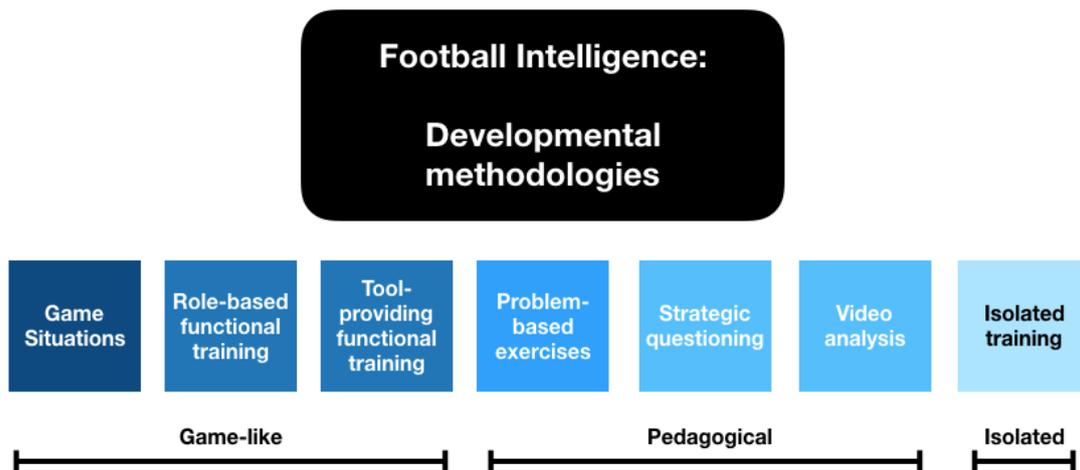


Figure 2. Above, the methodologies favored by the interviewed coaches are presented. These methodologies can be sorted in relation to their functional nature, as well as their apparent pedagogical influence.

When listening to the reasoning presented by coaches regarding their methods of choice, it can be inferred that many hours of on-pitch and off-pitch time were spent perfecting these methods. As one coach eluded to, it is important that everyone finds their own way of working with the development of football intelligence, and that this method be tailored to the specific group they work with.

When asked to describe what practical behaviors performed are by players that manifest football intelligence, three behavioral themes emerged. Firstly, several coaches seemed to consider information-seeking behaviors such as actively “scanning” the situation by looking around as a trademark of intelligent players. Secondly, other coaches explained how seemingly minute details such as which foot the player elects to control the ball with, and when they moved into space to receive the ball, were manifestations of football intelligence. Lastly, a player's willingness and ability to engage in self-reflective processes and re-experience situations to consider alternative solutions and outcomes was identified as a behavior associated with football intelligence.

### **6.3 Miscellaneous**

Finally, during the course of interviews, a number of interesting topics not specifically related to the research question at hand emerged. However, some of these citations are included and discussed due to their potential interest for football practitioners reading this work.

#### **Academy players/physical selection**

*“I have the feeling that players who’s grown up from academies, and they are very physically strong like let's say a winger... sometimes I can see they have some difficulties to get this game intelligence because they try to survive off pure speed, pure physical level and stuff like this... they never scan, compared to players who really read the game very well and try to predict the game instead of react to the game.” - Coach 2*

One coach provided fascinating insight regarding the development of football intelligence of players, especially those who developed in professional academy settings and have strong physical attributes. The coach eludes that these players to a lesser degree than others engage in scanning and information-seeking behaviors, and react more to the game rather than anticipating the play. One possible explanation for this phenomenon can be that the success these players had in vital years of development, was too heavily rooted in physical dominance of opponents, squandering the necessity for developing a great ability to read the game. Interestingly, the same phenomena may have been present in the development of some of the most “football intelligent” players. Players like Spain’s Xavi Hernandez and Italy’s Andrea Pirlo are players widely known for their superb vision and

ability to read the game, an ability which may have been in some sense forced to develop as there was no physical forthcoming to rely on for successful play.

### **Scanning as a tool**

*“scan, checking shoulder and body orientation is just a tool. The most important for the player is being involved in the game. It means that his level of concentration is constant during the game from 90 minutes because if most of the players are active,*

*I scan, I try to find the best space, the best place on the pitch when the ball is changing or going forward with the action and then the player becomes inactive, he's being passive. So of course, checking and trying to see as much as possible during the game, is the most characteristic aspect of intelligent players. Why?*

*Because I try to put my influence on the game, I'm not reacting, (to) what's happening but I also try to create what's happening on the pitch.” - Coach 4*

Previously, insight from coaches regarding information seeking behaviors like scanning were presented. Coach 4 above makes the distinction that the most important aspect for a player to be so involved in the game that they influence it significantly. In this sense, the process of scanning is contextualized as a tool for identifying the best space in order to be able to create situations themselves, rather than reacting to situations that have arisen. Pedagogically, this philosophy may help players better understand how they should think and behave during a match, and provide a relatable context to why they should be performing practical information seeking behaviors.

### **Creativity in solutions**

*“these players they can solve it on their own way, they create new ways to solve the problems.... and this is good because even as a coach then you learn, and the teammates even can learn more.” Coach 6*

Interestingly enough, several of the interviewed coaches touched on the fact that players often solve given solutions in training in their own unique way. These creative solutions can serve as a place of learning for both the coaches themselves, as well as other players. To limit the suffocation of creative solutions, coaches should attempt to form an environment with the

freedom to think outside the conventional box and facilitate the opportunities for creative solutions in various exercises and games.

## **6.4 Practical recommendations**

Based on the qualitative data from interviewing coaches and destining their wealth of expertise, a few recommendations for both coaches and players looking to improve their respective interactions with football intelligence can be presented.

### **Recommendations for coaches**

- To facilitate transfer of behavior and a player's pattern recognition ability, play with guidelines and structure (patterns) that are similar to those expected in the match,
- Provide players with guided information such as what to perceive and tasks to relate to,
- Work with details (tools) such as body orientation and perceptive scanning of the field to aid the information-collection process,
- Create exercises/training regimes that require intelligent decisions for success - create necessity for intelligent and creative solutions to a specific “problem”,
- Ask questions that promote self-reflection and deeper consideration of situations. After training, incorporate video analysis and apply a three-step process entailing experiencing, analyzing with video, and re-experiencing the situations,
- Use isolated situations to improve specific techniques, ensuring the good decisions can manifest themselves practically through execution,
- Promote players to value the importance of details such as passing to the correct foot, and to “time” their actions appropriately. Promote the players to evaluate their decisions and thought-processes when applicable,
- Remain open to players to solve problems in their own, creative way,
- In youth football, try to play in a way where physical dominance is not the central key to success. Instead, promote play in a way that requires players to be cognizant of the patterns of play. Be willing to see past short-term results for long term development,
- When evaluating the football intelligence of players, dividing this broad concept into components like “anticipatory ability” to gauge the player’s ability to anticipate play, and “evaluative ability” to gauge a player's ability to learn from and rectify their mistakes may be beneficial and provide more specific analysis.

### **Recommendations for players**

- Work actively to perceive the environment, and try to predict the course of play based upon what you see. Build a plan to solve the problem from the variables that you have identified,
- Play with intentionality and aim to influence the game through creating situations, not reacting to them, in relation to your unique skillset,
- During the match, be conscious of the situation that the match is in, and how that context may affect what an advantageous decision would be,
- Work consciously to develop technical excellency and automatization, to ensure that you have many solutions to a given problem at hand, and that your intelligent decisions can be practically manifested in a fluid manor,
- Value the importance of details in play that will create optimal advantages for you and your team, and be conscious of “timing” of your actions appropriately,
- Adopt a self-reflective stance on football situations, engage in metacognitive activities to promote learning, situational generalizations, and pattern recognition ability,
- Your physical and psychological state likely influence your ability to make intelligent decisions. Make sure they are in check!

### **6.5 Further research**

Further research on game intelligence in football and other topics discussed in this work should focus on dissecting subcomponents from a more scientific perspective. As information-seeking behaviors seem to be important for intelligent players, research could look to investigate how this process could be improved through experimental training methods for example. Additionally, the effectiveness of different training methodologies for developing game intelligence should be studied in relation to developmental phases of players taking into account age and experience, though this poses the need for a reliable and valid test of game intelligence which is no simple matter. Using quantitative research methods to compliment qualitative research methods, would also likely be beneficial to further understanding of the complex football intelligence phenomena. Research searching for notable relationships and variations between football intelligence and game intelligence in other team sports and even individual-based sports may also yield useful insights.

Finally, as scientific instruments and knowledge continue to development, investigations at a neurological level would be of interest; more specifically presenting answers to what actually separates football players from each other objectively.

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## Bilaga 1

### Litteratursökning

**Syfte och frågeställningar:** *Kartlägga olika synsätt/praktiska metoder kring spelintelligens, analysera skillnader/likheter. Hur definierar elittränare spelintelligens, och vilka metoder använder de för att träna spelintelligens? Ev. praktiska implikationer; underlag som underlättar vidare diskussioner samt utvärdering av spelintelligens. Ge inblick i praktiska metoder.*

### Vilka sökord har du använt?

(Peer Review, All types): football cognition, game intelligence football, creativity football, executive functions football, game sense football, perception soccer/football, tactical-decision making football, tactical creativity. Authors: Geir Jordet, Torbjörn Westberg, Daniel Memmert

### Var har du sökt?

*GIH:s bibliotekskatalog, Discovery*

### Sökningar som gav relevant resultat

*Discovery:*  
*tactical creativity football*  
*game intelligence football*  
*game intelligence soccer*  
*cognition soccer*  
*perceptual-cognitive skills football*  
*executive functions football*  
*perception anticipation*

*Authors: Geir Jordet, Torbjörn Westberg, Daniel Memmert*

### Kommentarer

*Flertalet relevanta artiklar hittades via funktionen "relaterade artiklar" i Discovery.*