From Complexity Paradigm to Morphocycle:

A Study-Map

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To you.

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A – Introduction

The aim of this study is to present an idea on how to structure different training cycles between two matches, taking into account the variety of days they might comprehend, and the subsequent implications of that variety on the training process itself. This theme is of an extreme importance in nowadays football, due to the season calendar being consistently increasing its density in matches. Therefore, the relevance of this theme is inherent to the coaches’ main tasks and responsibilities which are to, in one hand, further develop the team, and on the other hand, make sure the players are fresh (physically and, more importantly, mentally) to compete in the next match. Taking as an example the Norwegian context, the month of May has specific characteristics due to the overload of matches. With a clear understanding of different structures of the training cycles, coaches could have a better impact on the preparation of their team during that phase. In football literature, these training cycles are commonly denominated as Morphocycles.

“In biology, morphology is a branch of bioscience dealing with the study of the form and structure of organisms and their specific structural features.”

"In linguistics, morphology is the identification, analysis and description of the structure of a given language's morphemes, and other linguistic units, or implied context."

(Wikipedia, 2014)

According to this, the analysis of Morphocycle will be the study of the form and structure of a training cycle (in-between two matches), as well as its units (training sessions), and implied context. In order to do so, the methodology will be to proceed to a scientific literature review, with the aim of establishing the links between general theories and the specific context of football.
This analysis will be divided in two parts, the first elucidating crucial theories and concepts that help the understanding of the football complexity; and, the second part, which will focus more in the practical aspects of teaching and coaching football, but still connecting to the methodological theory.

The first part will begin by demonstrating how complex systems can be studied and acted upon through a non-simplifying vision. So, the first chapter will explain how the complexity paradigm allows coaches to view football teams (and clubs) as organizations and systems. By doing so, the foundations for breaking down the classical paradigms in training methodology will be set, providing the possibility to switch into the benefits of complexity, and proceeding through systemic modeling. For that, the notion of fractals will be explained, for a correct understanding on a reliable way to break down the complexity inherent to football. This will be done in chapter two.

After this, the three consecutive chapters will explain how modeling can be applied in football. Firstly by describing the dimensions that this sport comprehends, while making clear the nuclear importance of the tactical dimension for a correct development of the other ones. After that will be shown how the complexity paradigm also affects the notion of Playing Moments, demonstrating that the so-called phases of the game are, in fact, linked and interdependent sub-systems of a higher system: the playing. Following the clarification of the football dimensions and moments, the last chapter of part one will explain the value of integrating these notions into a conceptual and methodological pragmatic framework that aims at reaching the desired playing: the Playing Model.

The second part of this study, which will relate to the practical aspects of coaching, will initially explain the influence of establishing playing principles in order to achieve a structural and functional organization. After that, it will be suggested how those principles can become automatisms, by creating subconscious habits in players through somatic markers. Furthermore, in the following chapter, a description of the training principles will elucidate the practical issues related to the construction of the training cycles.
The final chapter of this part will then, through the Tactical Periodization training conception, recommend different structures of Morphocycles, explaining the reasoning of prioritizing certain aspects in detriment to others, always in order to reach the next match in the best conditions possible to maintain high performance levels. Those different structures will be directly related to the amount of days available to prepare each match. Furthermore, each day will be explained according to requirements and limitations, emphasizing on the predominant sub-dynamic that the session will require.

At the end of this revision, some personal thoughts will be presented, summarizing the importance and linking of the presented concepts; and then discussing existent limitations in the current literature, suggesting future areas of study for a continuous development of the football coaching practice.
B – Understanding Football

1. Understanding complexity through a systemic vision

*The “playing” can be studied through a scientific approach*

(Resende *et al.* 1996).

During many years, the common trend in scientific approaches, no matter the difference in realities, was to quantitatively analyse the various constitutive parts by separating them. Adding to this, the central idea defended that the development of the separate parts would improve the total, by mathematical logic. Nowadays, that logic is, despite true in simplistic quantitative data, losing its strength to paradigms that base their foundations in inter-disciplinary approaches, and consequently voting for different development practices.

As Capra (1996) underlined, the crisis of the classical paradigm is progressively destroying the disciplinary boundaries in which science had divided reality. Society now faces the abandoning of the mechanical approach, overtaken by a holistic and ecological one. The knowledge fragmentation in post-modernity seems to be thematic and not disciplinary, this meaning that all knowledge is local and total. Consequently, in the intervenient praxis, it is advised to think globally in order to act locally. The strength of the new know-how is based in contextualization, inter-disciplinarity and subjectivity.

Moreover, Morin (2007), defending his complexity paradigm, assures that the simplifying thinking is unable to conceive the conjunction of the one and the multiple (*unitat multiplex*). Either it abstractly unifies by erasing the diversity or, on the opposite end, overlays the diversity without conceiving the unity.
In accordance with these authors, it is easily understandable that the football game is something more than the dimensions acting together, which makes it incorrect to separate them. Instead, they should be reduced while not impoverished, respecting it as a whole. The game is a whole, but consisted of parts (the principles; and dimensions – tactical, psychological, technical, physical and strategical). The fracturing of these parts must be pragmatically achieved in order to develop the playing, not allowing its impoverishing by subjugating the parts to a sense – the desired playing (Gaiteiro, 2006).

Looking at the football game, a football club, or even team, through the perspective of an organization, which Bertrand & Guillement (1994, cit in. Guilherme Oliveira, 2004) define as a “system situated in an environment and comprehends: a cultural subsystem (intentions, aims, values and convictions), a techno-cognitive subsystem (knowledge, techniques, technologies and experience), a psychosocial subsystem (people linked through relations) as well as a management subsystem (planification, control and coordination)”, Morin’s unitat multiplex need is clearly present through the enunciation of subsystems inherent to the system itself, which in his turn is surrounded by its specific environment.

Adding to this idea, Tamarit (2007) defends that a football team, the game, and the playing that it produces, can be considered as open systems, adaptive and homeostatic, due to the high level of interaction with the context, as well as its capacity to adapt to it. Moreover, he underlies that, because football teams live internally in a permanent switching between order and disorder, with the aim to structurally adjust themselves to the necessity of each moment, they can be considered as homeostatic systems. In the figure below, an example of an open system diagram is depicted. More important than the variables enounced in it – which vary in accordance to the reality being studied –, the vital part is the observation of the existing links between all of them (internal climate), and also its openness to the external environment, which influences it and is influenced by it.
In line with the above mentioned authors, Cunha e Silva (1999, cit in. Gaiteiro, 2006) states that a complex system is a system which cannot be characterized by the reunion of the characteristics and qualities of its constitutive parts, and its behavior cannot be predicted through its components.

Taking this into account, both the football game and a football team can be understandable as organizations, and categorized as open complex systems. Consequently, being complex phenomena, in order to act upon them the most profitable way, Garganta & Gréhaigne (1999) defend that systemic modeling is the key, due to this process being considered: (1) interactive, because its constitutive players act in a reciprocity relationship; (2) global or total, because the value of the teams can be higher or lower than the sum of the value of its players; (3) complex, due to the profusion of relations between the different elements; (4) organized, because its structure and functionality are set through relations of cooperation and opposition, established within the respect of principles and rules and according to aims and objectives.
2. Understanding complexity through modeling

Narrowing our focus of attention to the game itself, the aim of this chapter is to understand the possibilities to model a game which, at first sight, seems complex, chaotic, random, and disorganized. In reality, further look will unmistakably demonstrate that these characteristics are correct. Taking this into account, how will it be possible to understand it? How will it be possible to model in a first instance, and subsequently act on it in an efficient way?

Firstly, it is necessary to understand the intrinsic characteristics of these associated concepts, always relating them to the football game. Garganta & Gréhaigne (1999) affirm that the football game lies in a complex logic, not only due to the number of variables in play, but also due to the unpredictability and randomness of the situations that the players and the teams face. According to the same authors, the nature of the football game comprehends a complex structure due to (a) the extension of relations between players, (b) the fact that the game’s actions do not follow a predictable and sequential order, having a high degree of indeterminism, (c) the presence of systems that undergo quick changes, with numerous and diverse components.

Moreover, Guilherme Oliveira (2008) underpins that chaotic systems (football teams) are characterized by an amount of interacting agents (players, coaches, etc.), which cooperate, with common and coordinated aims and behaviors, creating a certain order (playing model – individual and collective patterns of action) and stability in a chaotic context of disorder and permanent instability. Consequently, the football game is a confrontation between two chaotic and deterministic systems with a fractal organization.
In order to understand this definition of the game, it is vital to have a clear notion of what a fractal is, and what it means when associated to the football game.

![Figure 2: Fractal](image)

As defined, a Fractal is the propriety of fracturing and representing a chaotic model in sub-models, existing in different scales, and which are representative of that model (Mandelbrot, 1991, *cit in*. Guilherme Oliveira, 2008). This meaning that it is a constant or regular part of a chaotic system which, by its structure and functionality, manages to represent the whole, no matter the scale in consideration. (Resende *et al.* 2006).

Starting from this definition, and establishing a parallel to the football game, looking at the fractal represented in Figure 2, it is possible to imagine this pyramid representing either (1) the Playing Dimensions, or (2) the Playing Moments:

1 – Each side representing each dimension (technical, physical, psychological, and strategical), and the whole pyramid being the Tactical Dimension, constituted by all interlinked dimensions, at all times present no matter the dimension that is being looked at (Chapter 3);

2 – Each side representing each moment (established attack, established defence, offensive transition, and defensive transition), and the whole pyramid being the Game, in which all moments are present in each side (Chapter 4);

It is these two examples together, that provide a starting perception of the modeling opportunities and, nevertheless, the required praxis in football.
3. Applying complexity through the Tactical dimension

*Tactic is the set of behaviors that Mourinho wants for the team, desiring their manifestation with regularity in competition, i.e., the set of principles that embody his Playing Model. It is a specific behavioral culture that requires learning. It is, thus, an emergent propriety.*

(Resende et al. 2006)

*The tactical dimension as culture is what allows identifying teams, this being, the organization that teams show regularly is what evidences an identity.*

(Resende et al. 2006).

As seen in the first example of the fractal above, the inseparability of the dimensions becomes an established factor, since the identity of the whole – the *playing* – results from the established connections between them (Maciel, 2008). However, not all dimensions possess the same hierarchy, due to the impact they have on the team’s performance. As Guilherme Oliveira (2004) explains, all type of action and interaction that the player(s) execute during the game must be subordinated to the Tactical Dimension. This is the dimension that gives sense and unifies the game. The expression of the team and player dynamics is based in an intentionality driven by tactical needs. The tactical aim is selected as causal element of the behavior, central part of the making of the future.

Conceiving the tactical dimension as a **Supra-dimension**, it coordinates the entire training process, giving sense to the game and its *playing*. The tactical dimension results from the interaction of all other dimensions (technical, physical, psychological and strategical), while giving sense to them, since it provides an intention prior to the decision-making.
From Complexity Paradigm to Morphocycle: a Study-Map

As supra-dimension, it is a categorical aim and a referential which appears from the existence of the process, an intentional emergency. It has to work as a reflection and action guide, central element, and not as a residue or performance sub-product. Due to this, it also requires a methodological foundation that does not misrepresent the competitive specificities.

![Diagram](image)

**Figure 3: The Playing and its Dimensions**

As shown in Figure 3, the tactical dimension conditions the physical, technical, and psychological dimension, developing them as a consequence of the operationalization of a *playing*. Accordingly, it is not methodologically coherent to undertake technical or physical training exercises without being under a tactical framework, due to the need for each technical action to be based on intentionality – a tactical need –, and each “physical load” needing to be associated with a Central Nervous System fatigue, achievable under decision-making processes, which are present in tactical situations. Under such framework, the players will develop the recognizing of a tactical sense in each behavior, understanding the significances of the tactical actions occurring during the game, the aim. This need makes players undergo through more than simple perceptions. They will be able to interpret motor behavior, giving it a sense in a higher context – collectively shared –, understanding the whole. The Playing Model (see Chapter 5) works then as an agglutinating and coordinating force, promoting self-organization (Gaiteiro, 2006)
However, as a note, it is crucial to underline the difference between tactic and strategy, with the latter one being match-specific adaptations, and always subordinated to the first one – the team’s behavioral culture. The strategy determines that slight adaptations to the opponents’ playing system might occur, however, while with the ball, the own playing system should be priority.

As interfering as the strategical side might be, it can never become the fundamental attractor. If doing so, the regular modification would destroy all efforts in order to establish a behavioral regularity, by the constant modification of habits, automatisms, references, mental images, cognitive processes, action schemes, communication between parts, regulating principles, somatic markers, all of these indispensable in the setting and performing of a playing culture (Gaiteiro, 2006). These notions will be further explained in the second part of this work which focuses on the practical aspects of teaching the football game.
4. Understanding of the Tactical dimension through the Playing Moments

“Only an understanding of the Game by its “Whole” accepts an approach that doesn’t remove from the “playing” its nature, this meaning its “unbreakable wholeness”.”

Carvalhal (2007)

Following the explanation of the figure representing a fractal, the second example was related to the Playing Moments. In order to understand its fractal characteristic, the differentiation between moments and phases must be explained. Guilherme Oliveira (2004), about this difference in terminology between Playing Phases and Playing Moments, explains that phases have a sequential characteristic, one happening after another one (see Figure 4 below). The author considers that the game has four moments, which do not occur in a sequentially pattern, presenting themselves randomly instead.

Moreover, Amieiro (2007) explains that all these moments are linked to each other, and cannot be looked at in a closed-frame way. Furthermore, the moments of the game are interdependent and related to each other, with the attack and the defense not being separable, not only due to belonging to a whole, but also due to each one conditioning the other (Sanz, 2010).
In the figures above, the difference between terminologies is depicted, contrasting the sequential pattern, on the top, with the *playing* having four different and separate phases, with their own principles; and, below, four playing moments that are linked and interdependent, sharing moments in time and having principles that go hand-in-hand.

In accordance with this model, Moreno (2010), using a systemic thinking, suggests that the moments of the game have to be seen as **subsystems inside a superior system**, in this case the football game, therefore being all related to each other, not being separable from its totality, because the fragmentation of the parts of a system doesn’t only separate them, but also eliminates their proprieties.

The respecting of these characteristics allows the coaches a correct definition of the principles and moments to be set in the Playing Model and, consequently, a truthful background for the practice, i.e. training methodology.
5. Creating a personal logic of the game through the Playing Model

“To conceive a model is to allow the conceiving of the complexity’s intelligibility. If conceiving is organizing, organization is the nuclear concept of complexity.”

(Faria, 1999)

According to Le Moigne (1990), a model can be considered a simplified representation of reality, and it is related to constructive processes, which are linked to knowledge conceptions of a certain phenomenon or reality. Linking this to the coaches’ responsibility, the conceptual matrix deriving from the coach’s ideas intends to give life to the desired playing, by modeling it. It is therefore the transforming of abstract ideas into a concrete model.

More specifically, the necessity of a Playing Model is explained by organizational learning in meanings: 1. because it is impossible to act in a coherent way without the existence of an aim in a distant future. 2. Because future exists, despite being imprecise and obscure seen from the present, being clearer to understand along the way, allowing the thorough designing of the path. 3. Because it allows players to learn beforehand, before being obliged to act, having an agglutinating effect on the individual and collective actions (Gaiteiro, 2006).

However, as the same author proceeds, no set of predictions or visions can contain, in its operational detail, sufficient information about the actions to undertake in the present, but might have something to say in relation to the general traits. Despite the game’s ambiguity, it is possible to identify probabilistic links and be active upon the future, requiring thus a playing conception and, consequently a Playing Model.
Linking these notions to the concepts presented in the previous chapters, Guilherme Oliveira (2008) introduces the Playing Model as a playing idea, constituted by principles (and its sub-parts) which represent the different playing moments that are interlinked, creating an own functional and structural organization, i.e., an identity. Being a Model, it always presents itself as a conjecture, always being open to individual and collective additions, thus always in construction and evolution, with an unattainable final aim.

This unattainable final aim derives from the model being a constant dialogue between the coaches’ intentions and the context variables. A model cannot be a rigid structure, uniquely imposing repetitive mechanical behaviors. Successful systems work in unbalanced states, this meaning that they have enough flexibility to manage change and deviant behaviors as, for example, players’ creativity.

Accordingly, the Playing Model is constituted by a highly complex net, formed by the interaction of innumerous aspects such as the coach’s ideas – the desired playing; the training methodology (principles and matrix); his leadership and sensibility; his group management;…, and the context variables – the country’s culture, the club’s culture, board aims, board members’ characteristics, players’ characteristics (in relation to the game, beliefs, history, personality, etc.), the fans, the press, among others (Tamarit 2013, cit in. Tobar 2013).
In relation to its operationalization, to create a Playing Model, the coach has to have a clear idea of which behaviors/principles he would like his team to have in the different Playing Moments. After the setting of principles and moments, it is through the day-to-day practice, that the process will shape desired behaviors and intentions. As explained by Capra (1996), the construction of new knowledge must result from the permanent dialectic between the intervenient practice and the theoretical referential that frames it. Objectively, what is required is a coherent concept-methodology. The neural patterns that the players build through the external object – the game –, and the neural patterns reconstructed inside their brains through the memory – these ones built through the game situation, visual presentations, demonstration, explanations and interventions –, must go hand in hand, being this achieved through specificity (Gaiteiro, 2006). Consequently, the coaches’ actions during the process should all be linked to the priority principles to be taught in a certain moment.

To work under a framework of a Playing Model is to work with a reference, a desire to be attained; hence the need to build the present in accordance to what is projected (Frade, 1985, *cit in* Tobar, 2013). “The aspired future will condition the present” being a never-finished process, “where the playing idea – the future – determines the rise of a functionality, and functionality only becomes it, if in the way it originated a structure”. It’s in the process of transforming ideas into a regular functionality, that a methodological matrix for modeling will be key.

As a conclusion, Gaiteiro (2006) underlines that the model doesn’t only describe in a methodic and systematic way the relations’ system (collective) which are established between the different elements (individuals), in a certain game situation. It is fundamentally an action promoter, which describes and defines situations, behaviors, positions, tasks, responsibilities and competencies, allowing the acquisition of an associative and cooperative intelligence, through the selective and contextual dominance of dynamic attractors (playing principles and sub-principes).
C – Teaching Football

6. Teaching the game through Playing Principles

“The aim will always be the same: create cerebral the behavioral dynamic which is organization, philosophy, and emotion. Create intentions and habits. Make conscious and later on subconscious, a set of principles in order to naturally enhance a way of playing.”

Faria (2006)

Educating is habituating the brain to command the body. Football is a know-how which is acquired through experiencing, and promotes knowledge about the know-how, the understanding of the action, establishing a certain relation between the mind and the habit. Only the intentional action is educative (Castelo, 1996). In order to establish this link between the mind and the habit, the player’s actions must be compared to their intentions, which can be previously set through the Playing Principles. These, defined as “intentionality patterns related to the playing, which sustain the criteria expressed by the different scales of the team (individual, groupal, sectorial, intersectorial, and collective), and being regularly present in the game – in the Playing Moments – will provide it an identity and functionality” (Maciel, 2011).

Consequently, having set the Playing Principles, the coach needs then to transfer them from the conscious level to the subconscious, creating habits, making players naturally behave in accordance to the playing. This is done through exploiting the somatic markers’ influence on players’ decisions.
“Somatic Markers are a special case of the use of feelings created by secondary emotions. These emotions and feelings were connected, through learning, to predicted future results according to certain scenarios. When a negative somatic marker is linked to a certain future result, the combination works as an alarm bell. On the opposite end, when it’s a positive somatic marker which is linked, the result becomes an incentive.” (Damásio, 1996) In other words, the internal system of preferences is inherently predisposed to avoid pain and search for pleasure. This is shown in the diagram below where, if training exercises are coherently structured, if a player’s action goes in accordance to the playing model, he will be successful, therefore establishing a positive somatic marker which will influence his next decision in that way, even if that decision is subconscious.

During the matches, players are asked to decide quickly and many times in a subconscious manner. The decision-making happens under the control of an internal system of preferences, and under the influence of a set of external circumstances. Consequently, through training, the coach must create situations where the players’ decisions go in accordance to his playing, but also making them feel that those decisions were their own. This is done by changing their internal preferences, designing exercises where players reach more often success when deciding according his playing. In order to do so, coaches have a useful tool which is the Propensities Training Principle (see Chapter 7).
Taking this into account, the acquisition of certain intended interactions by the players requires exercising, in order to emotionally qualify the responses, which will then enhance certain decisions and eliminate others. But that necessitates the happening of the intended interactions, i.e., the playing principles. (Gomes, 2008)

Having understood how to positively use somatic markers, it is important to realize the advantages of creating these subconscious habits. “Habit is a learned mental action which can be done without thinking or conscious supervising. It is also called fixed action pattern, or automatism” (McCrone, 2002) Additionally, the habit or the automatism result from knowledge, i.e., mental images which have been created by experiences, some conscious and other subconscious, which have been stored in memory, and will be used to quickly decide and react to certain situations. (Damásio, 2000, cit. in Resende et al. 2006)

But the crucial part is how this is linked with the players' behaviors on the pitch. And, in fact, the acquiring of a playing with a previous intention only occurs through action – repetitive intentional action. It is a habit acquired through action. The systematic undergoing to the Tactical Periodization training by the players allows to create habits and automatisms related to a playing, helping them to take and execute decisions in a faster way, in the heat of the (inter)action, counteracting the natural slowness of the brain. The habit requires the creation of somatic markers, which help the body to decide faster, influencing in accordance to the desired playing (Tobar, 2013).

As clarified in the graph below, through systematic repetition of the decision-making processes, if the player decides in accordance to the desired playing, creating positive somatic markers, the level of consciousness required for the next similar decision will be lower, decreasing its total amount of time needed.
As McCrone (2002) emphasizes, “It is an intelligent trick to save time, which works when the brain experiences the same situation enough times, to achieve a connection as a habit”. Furthermore, Casarin & Greboggy (2012) say that, not like trivial decisions, complex ones demand a higher set of interdependent dimensions. When these are not habituated (automatized), much effort is required, leading to a state of fatigue (Central Nervous System). This is shown in the graph through the third axis, on the right. In other words, coaches should pursue this “neurobiological economy” – with the habit making the complex cortex-body-action triad to be put aside, reducing the neurobiological effort –, in order for players to have a fresher brain, which will increase their creativity levels, since they will have more energy for creating solutions of higher complexity. Thus, players stop spending their attention in elementary aspects, directing their focus to more dynamic ones, as the managing of the here and now – how to materialize an idea in a certain moment, under certain circumstances. The players manage successfully the moments, in accordance to the Playing Principles, as a result of the habituation acquired during the training process, where somatic markers were established.

Concluding, it is vital for the training process to be specific, not only to create somatic markers related to a playing, but also to make the previous intentions (playing idea), which are conscious, be intentions in the act, which most of the times appear through a subconscious pattern, in order to optimize the decisional processes (Tobar, 2013).
7. Structuring the coaching through Training Principles

“I don’t see any other possibility than the systematic repetition in Specificity of the Playing Principles, because it is fundamental to understand that organization is success, and the more organized the team will be, the higher the probability of success.”

(Faria, 2008)

The Playing Principles (and their sub-parts), and their interaction in the different Playing Moments, is what is needed to be trained, through the different scales (collective, intersectorial, sectorial, groupal, and individual), revealing a fractal organization in its development (Guilherme Oliveira, 2009, cit. in Tobar, 2013). Therefore, no matter the scale to be developed, it needs to be representative of the wholeness. Following this globality concept, the playing idea, in conjunction with the matrix of methodological principles, will allow the existence of a coherence and a logic in the guiding of the whole training process. This matrix comprehends:

1. The Specificity “Supra-Principle” – is the constructing of exercising contexts, during the training sessions, which derive from and report to the playing idea, the playing that is intended to be developed with the players, but without putting aside the respect of the Tactical Periodization’s training principles. The Specificity contextualizes everything that is done (Guilherme Oliveira, 2010, cit. in Tobar, 2013). Moreover, Specificity should not be considered a methodological principle, but a categorical imperative instead. It is a necessity to beacon things, to direct the process, and to guide this direction (Frade, cit. in Tobar, 2013).

“Specificity lies in a concept of globality which comprehends the relation whole-parts, contextualized in an Organization” (Gomes, 2008).
2. **Dismantlement and Hierarchisation of Playing Principles** – it is a methodological principle related to de-structuring of the playing principles into the different sub-parts, moments, and organization levels that the team can assume. In doing so, coaches create a teaching and learning logic in accordance to the *playing*.

3. **Propensities Principle** – allows chaos to be deterministic, since it refers to the modeling of the exercising contexts, with the intention to create contexts that relate to a playing, increasing the occurrences of the desired behaviors (Maciel, 2011). This principle prioritarily relates to the systematic repetition of the desired concepts at a certain moment, them being tactical (through the Playing Principles), technical (any desired execution), and physical (predominance of any type of muscular contraction; predominance of any metabolic mechanism).

4. **Principle of Complex Progression** – it relates to the choice and management of what is priority to be trained in a certain moment, taking into account the Playing Model, the intentions for the next game, and the occurrences in the previous game. Moreover, it demonstrates that the acquiring of the *playing* does not occur in a linear fashion, but in a complex way instead, since it is developed according to a playing idea. During the process, it is necessary to progress from low to high complexity, but always within a complexity framework. This is evidenced during both the season and the training session, however having to be managed through the Morphocycle in a non-linear fashion.

5. **Principle of Horizontally Alternating Specificity** – it refers to the invariable preoccupation of operationalizing a playing idea, though the scale in which this is achieved is diverse. Through the week, different scales of the *playing* are distributed, alternating the type of muscular contraction which is predominant, the complexity of the exercises, and the intensity in which they are undertaken, in order to manage a correct effort-recovery balance, protecting the involved structures. It is denominated as horizontal, due to this alternation being done along the week, from day to day, and not within a training session – which would be vertical (Tobar, 2013).
The methodological principles, despite being possible to conceptualize separately, cannot be understood in this way, and especially not operationalized in such manner. On the contrary, being looked at in this way they lose sense, since the logical operationalization of the *playing* emerges from a pattern of connections between the methodological principles. Only through these connections it is possible to structure the systematic repetition of the pattern Morphocycle (see Chapter 8).

Nevertheless, as described by Frade (2003), this operationalization cannot be purely academic, and requires a good level of "phenomenotechnique" by the coach, which relates to the coach sensibility to drive the training process, this meaning the defining of the path that will transform the abstract (ideas about Playing Model) into concrete (training and game, its own). This phenomenology emphasizes the pragmatic side of the training process, due to the existence of a difference between the being/intervening and the pure scientific academism.
8. Coaching the game through Tactical Periodization and its Morphocycles

“There is the traditional training, analytical; there is the integrated training, which is the one with the ball, but where the fundamental preoccupations are not that different from the traditional training; and there is my way of training, which you can call Tactical Periodization, which has nothing to do with the other two – despite many thinking so.

The only difference between the traditional and the integrated training is that, in the last one, the players are “fooled” by giving them the ball. But the consequences of the training are exactly the same as the traditional training. (...) If a player never met Tactical Periodization and worked all his life in the traditional way, he won’t feel the need of what he ignores… they’ll give him that sort of integrated and he will like it. (...) Nobody misses what they ignore.”

Mourinho (cit in. Gaiteiro, 2006)

Tactical Periodization is a training conception with own methodological principles, following a different logic, which is centered in a teaching-learning process, having the main aim the acquisition of a specific playing. The creation and acquisition of this playing requires time, thus the necessity of temporally distribute its acquisition. This is done through the season, in general terms, and through the Morphocycle, in structural and operational terms (Tobar, 2013).

As the same author describes, this training conception privileges a particular playing order (Playing Model), embodied by specific principles and sub-principles, which articulate themselves in a coherent manner along the different moments, always respecting the specificity principle of the subject (system/players) and the object (the playing). According to Maciel (2011), “it follows the systemic thinking and, consequently, it has an emphasis on the relations, the quality and the patterns, without refuting in its evolution the intuition”.
For these relations, the aim is to create a fusion between the pretension (previous intention) and the occurrence (intention in action) between all players of a certain group. Gomes (cit in. Tobar, 2013) adds that, to develop a playing, its ideas, it is necessary to recognize that football is a collective game, constituted of individualities that relate to each other, and make emerge a dynamic as a functional whole. This means, it also needs the acceptance that the coach models human beings in interaction. The Tactical Periodization demands the person to be respected as human being, i.e. and intelligent being, sensible, adaptable, and capable of doing it among others. In order to do so, the coaching needs to be done in a dialectic way, maximizing the players’ interventions in the decisions of which direction to go. Summarizing the relational aspect, Resende et al. (2006) explain that "the evolutionary dynamic resultant from the training through this model is \( \text{(co)auto-hetero} \). Auto because individual changes occur. Hetero, because the playing principles fundamentally contemplate relations between several individuals. Thus, the individual progresses, but subjected to a logic that has to do with the coexistence and growth of the others, in a common framework which relates to a playing conception. Therefore, the (co)."

In practical terms, the operationalization of the Tactical Periodization aims at performance stabilization at a high level, which will be possible to reach through the respect of a week pattern, the Morphocycle pattern, in opposition to the week and cycle variations commonly seen. The operationalizing logic of the playing arises through the connecting of the methodological principles (training principles), which create a process matrix embodied as the Morphocycle, which represents the playing morphology distributed in-between two matches. Each cycle is similar to the previous and next one, in relation to its form, and must be understood through its fractal organization, since it must be assumed as a methodological regularity (core of the training process). Its \textbf{systematic repetition} allows the team and the players to acquire relevant aspects of the playing, without risking their recovery. It promotes a high dynamic of occurrences which maximizes the performance levels, as well as keeping the players in competitive shape along all weeks of the season (Tobar, 2013).
Here below will now be shortly described the different Morphocycles, according to the amount of days in-between each match – from the normal six-days pattern, until the two-days cycle. In order to do so, firstly the color code represented on the diagrams needs to be recognized, for a correct understanding of its meaning. Consequently, in the figure below is shown the type of sub-dynamics in the muscular contractions that players will endure during matches (duration, tension, and speed). Therefore, these types of muscular demands should be present in different days of the preparation, to allow their development, but always as predominant sub-dynamic, and never taken out of their specific context.

![Colour Codes of Physical Sub-dynamics](image)

Secondly, each day of the six-day Morphocycle, and its main characteristics, will be summarized to allow an understanding of the reasoning behind the selection of days to “sacrifice” in shorter cycles.

![Six-days' Morphocycle](image)
1st Day after the match:

Despite the consensus about the physiological importance of training the day after the competition, due to the advantages on removing acid lactic and other sub-products from the muscle metabolism, as well as increasing the process of bringing oxygen to the cells, and bettering blood flow (Tobar, 2013), this view is only related to one dimension, in this case, the physical one.

Considering the player a human being, a “psycho-biologic” identity (Maciel, 2011), the magnitude of the mental/emotional fatigue cannot be overlooked. Due to this type of fatigue requiring more recovery time, and due to the limited concentration levels and emotional predisposal that players evidence the day after competition (among other psycho-social variables), it is suggested, in six-days Morphocycles, to have day-off on the first day.

“(…) The best way to recover, in relation to the mental aspects, (…) has nothing to do with theory, but the coaches’ sensibility to understand the team’s needs (…). Your emotional state allows a better global recovery.” (Faria, 2007, cit. in Tobar, 2013)
According to Tactical Periodization, the way to train is always related to the *playing*, whether it is in the acquisition or the restitution period. Consequently, this day is categorized as light-green, since it is the mixture of the green (match colour) and the white (day off).

“During recovery, players need predominantly to have an effort that is identical to the match, in relation to concentric and eccentric muscular contractions, changes of directions, jumps, passes, pressures, ball circulation, in order to have actions identical to the match in technical, tactical and physiological terms. (...) Simply to activate the organism the same way it’s activated in the match, but with much intermittence, many breaks…” (Guilherme Oliveira, 2010, *cit in.* Tobar, 2013)

The stimulus’s must be short and of “high” intensity, using predominantly the alactic anaerobic metabolism, and providing large resting periods in order for the aerobic metabolism to proceed with the regeneration, reorganization and refeeding of the organism. (Maciel, 2011)
3rd Day after the match:

Since on this day the totality of the team is still not recovered (due to some players needing more time, especially on the mental aspect), the aim of this session is to start working on the playing, but without jeopardizing the session of the fourth day, which is the one where there is the certainty of having a totally recovered team, and consequently the best moment to train with the highest complexity level (bigger structures). Therefore, in order to work on the playing while allowing players to fully recover, the intention will be to practice the sub-principles (and their sub-parts) through intermittent fractions of the game, i.e. medium-sized structures (ca. 3v3 to 6v6). In relation to the muscular contraction prevalence, the work should be done under the dominance of the tension of contraction, thus the exercises should promote high amounts of football-specific actions (accelerations, changes of direction, shots, etc.). In order to promote that, the exercises should be done with reduced sizes, number of players, and times. “Besides the articulating of the different playing principles, it is also necessary to put together the sub-principles of each bigger principle. As an example, if I define ball possession as a principle, it is not enough to overuse it in an 8v8 exercise. That would be too reductive, since under that ball possession there are sub-principles to be worked on. What we do is to take those sub-principles, like possession with zone-transition or avoiding pass to first station, and potentiate them in very reduced spaces and with fewer amount of players. Then, in a context with higher amount of players and larger spaces we articulate those sub-principles.” (Mourinho, cit. in Tobar, 2013)
4\textsuperscript{th} Day after the match:

![Sub-Dynamic: Duration Diagram](image)

Figure 13: Duration Sub-dynamic

In this day, due to the team being fully recovered, the complexity level should be high, allowing the training of the main principles in bigger structures (amount of players). Since the organization level comprehends to globality of the \textit{playing}, the characterizing of this day assumes the color green, resulting from the adding of the other two days of the acquisition period, blue and yellow. However, it is important to notice that the green of this training is not the same green of the match day, since the demands of a training session will never equal the demands of the match.

It is also the best opportunity to work with the strategical details that the next opponent might demand. Physically, it should be similar to the competitive demands, with large spaces, and a dominance of the duration of the muscular contraction, thus larger times of the exercises. However, even if this day requires more continuity, it should still be in a discontinuity framework, i.e. with regular breaks, due to this being the intrinsic logic of the football game, and to allow the maintaining of high concentration levels, as well as the technical proficiency. Basically, it is the density level of the session (time in play vs. time in rest) that should be high.
5th day after the match (two days before next match):

The density in this session should be low, but not as low as the third day, since in that day players were still recovering from the previous match. However, this should be the day with the lowest mental-emotional and also physical effort. This is due to the necessity of protecting the mental and physical freshness for the next match, two days later. Consequently, the exercises should be of very low structures, aiming at the acquisition of sub-principles (and their sub-parts).

However, it is a session of the acquisition period, with its dominant trait the speed, this including not only the execution, but also the information analysis – decision-making –, i.e. a speed contextualized in the playing. “What needs to dominate in this training are the situations of high speed of execution and decision, therefore the necessity of avoiding everything that can create noise. The priority in this training is to have dominant demands on the motor cortex in relation to what is done with spontaneity, what is habit.” (Maciel, 2011)
6th Day after match (day before next match):

![Sub-Dynamic: Predisposal to Competition](image)

The day before the match the main aim is to develop the predisposal to competition, in order for players to reach the match in the best way possible. In order to pre-activate players for competition, the exercises should be of very low complexity level, executed at high speed, short periods of time and large breaks. This is easily understandable through the color code, which is a mixture between the day before (yellow – speed sub-dynamic) and the day-off (white), originating the light-yellow code.

During this day, the situations that can be trained should be of very low complexity level in order to have no demands on the concentration. This can be achieved through exercises that require solutions which are already automatized by the players. Adding to this, if required, some strategical aspects about next match can be mentioned, however going through them with no associated competitiveness.

After the describing of each day, it is now possible to think about the variety of Morphocycles that coaches have to face, due to the inherent characteristics of the season calendar that comprehend different competitions.
Five days’ Morphocycle:

![Five-days' Morphocycle](image)

Taking into account that the session of the fourth day (in a six-days cycle) is the one that is more similar to the match, it is common sense that the subsequent load to the players is also the heaviest of the week. By load not only the physical demands are considered. Due to that session having the highest levels of complexity – interlink of main principles, strategical adaptations, and bigger structures in relation to number of players – it is the one that requires more emotional and cognitive effort, thus originating higher fatigue to the Central Nervous System. Moreover, due to the physical sub-dynamic being predominantly related to the duration of the muscular contractions, also in the physical dimension it generates higher levels of fatigue.

Given that in a five days’ cycle there will be no time to mentally and physically recover from that session, due to only having one more day prior to next match, this should then be the session that is removed from the pattern Morphocycle. As described above, the priority will always be to ensure the mental and physical freshness of the players in the next match.
Four days’ Morphocycle:

In a four days’ cycle, the same thinking process has to apply: the priority is firstly to recover from the previous match. Therefore, since from the three acquisition sessions (in a six-days’ cycle) the only one that allows the continuity of the recovery process from last match is the tension sub-dynamic, this should be the one to prioritize in such cycle, that only comprehends one acquisition day. Any other solution would, either put at risk the freshness for next game – if deciding for another sub-dynamic – or, not allowing the further development of the playing – if opting for another recovery session.

However, it is crucial to note that in Tactical Periodization no suggestions should be considered as recipes, due to the importance of the coach’s sensibility to understand what the team requires in each specific moment. For example, in a four days’ cycle, as depicted above, the coach could perfectly decide to give one more day-off after the match, or add on more recovery session instead of having an acquisition day. The suggestions are always considering the further development of the playing, but not always the team is mentally ready for it.
Three and two days’ Morphocycles:

In cycles where there is no possibility to include any acquisition day, the main aim will again be to fully recover the team in all aspects. In these circumstances, coaches shouldn’t be afraid to only promote recovery sessions, or to include sessions that aim at the predisposal for competition. According to Maciel (2011), competitive moments with high density of matches are extremely tiring, not only in bioenergetical terms, but also because matches promote high acquisition levels themselves. As a result, matches work already as tool for the development of the playing, having the sessions only to fully recover for them.

It is important here to remember that, in Tactical Periodization, the pattern of Morphocycles should start directly in the pre-season (very early – second to third week), this meaning that, until the season reaches competitive moments of high density in matches, the team already has had an amount of cycles to acquire the playing, thus being already very comfortable in their own Playing Model.
9. Discussion

This work intended to establish a study-map for football practitioners and, in particular, coaches. However, due to its fundamental mission being the presentation of an approach which contradicts the prevalent variety of practices, all readers that are keen in critically analyze how to develop the process, can investigate more on a philosophy that aims at respecting the reality of football. Consequently, instead of a thorough explanation of certain theories, this text needed to be structured reaching a large array of themes, explaining how they are linked between each other and, most importantly, how they are intrinsically connected to football. In doing so, the reader would possess a self-educating tool which would allow him to firstly form his opinion on the value of the complexity paradigm for understanding and teaching football, and secondly to study those concepts in a more detailed way.

This study-map was then divided in two parts, with the first bringing a perspective on how to theoretically perceive football and, more concretely, football matches; and the second part, more focused on the training process itself, aimed at elucidating the necessary principles associated to the development of a team and, furthermore, how to interlink those principles in a pragmatic framework.

Accordingly, it started by confronting the classical paradigm with the complex thinking, underlining the value of looking at teams as open and complex systems. In doing so, the notion of fractal was explained in order to act upon those systems without impoverishing the reality and its consequent end-product. This would be done through systemic modeling of the \textit{playing}, i.e., the desired behaviors during the football matches. Inevitably, that led up to a representation of the dimensions and the playing moments: (a) the first illustrating how the technical, physical, psychological, and strategical
dimensions only made sense under a tactical framework, due to each one of them requiring a predetermined intention to be correctly analyzed and developed. The tactical was then considered a supra-dimension, due to unifying all others, and providing a sense to each behavior, promoting a collective intelligence; (b) through this unifying characteristic of the tactical dimension, the playing moments were then exhibited as linked and interdependent, with a non-sequential pattern, opposing to the concept of playing “phases”. In the last segment of part one, the notion of Playing Model was clarified, by highlighting the value of systematically model the above mentioned moments, in order for the coach’s abstract ideas being converted into a concrete framework for players.

In the part of this assignment that followed, dedicated to the training process, the first aim was to enlighten how the concrete notions of the playing model would create an intentional, structural and functional organization, by the playing principles. More practically, it was explained how, through training, and creation of positive somatic markers, those principles would become subconscious habits, increasing creativity levels by neurobiological economy. Subsequently, to achieve this, the framework needed to follow training principles that would maximize those automatisms. Therefore, here were explained the five most important ones: specificity, dismantlement and hierarchisation of playing principles, propensities, complex progression, and horizontally alternating specificity. Nevertheless, such concepts cannot be used in an incoherent manner, requiring to be temporally distributed through the training cycles in-between each matches. As a result, several distributions were presented, according to the number of days a cycle could assume. Five different morphocycles were suggested, discussing the methodological priorities to allow the team to be fully prepared for the subsequent match. Moreover, each day of the morphocycle was explained through the importance of the required complexity level and predominant physical sub-dynamic associated to it.
10. Future recommendations

By doing this revision of the literature on Tactical Periodization, it was clearly noticeable that, despite its integrated approach and consideration of a supra-dimension that is tactical, the presented periodizations themselves are based upon physical sub-dynamics – which, being totally fair, are “tactically-physical” –, and not “tactically-strategical” with a physical sub-dynamic under it, as they should be. In order to reach this knowledge level, which would in practical terms, i.e. on the training periodization itself, relocate the tactical dimension as the higher force, there are two vital themes to be looked upon: (a) knowledge on hierarchies in playing principles; and (b), information on playing principles’ periodization.

(a) There is a clear need for coaches’ development in game understanding, to know and comprehend which playing principles experienced coaches define for their playing moments. Moreover, the detailing of those into sub-principles (and their sub-parts), and their hierarchisation by significance, would be an extremely valuable tool for further development.

(b) Adding to this, the existence of studies that explain how experienced coaches temporally distribute that hierarchy of playing principles through the season, in order to reach faster learning and development rates, would bring a pedagogical and methodological debate which would have a tremendous impact on the game itself, and its intelligibility.

However, these limitations in the literature are a normal consequence of the (still) few practitioners that follow a systematic and complex approach to the team and player development process. This work intended at gathering a few more…
E – References


Maciel, J. (2008): A (In)(Corpo)r(Acção) precoce dum jogar de Qualidade como Necessidade (ECO)ANTROPOSOCIALTOTAL – Futebol, um Fenómeno AntropoSocialTotal, que “primeiro se estranha e depois se entranha” e… logo, logo, ganha-se! Undergraduate dissertation presented at Faculdade de Desporto da Universidade do Porto, Portugal.

From Complexity Paradigm to Morphocycle: a Study-Map


Wikipedia, Morphology, biology: Available at:

Wikipedia, Morphology, linguistics: Available at: