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Strategic Excellence in Padel: Design and Validation of Key Tactical Principles

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Abstract: The purpose of this study was to design and validate a guide to strategic principles in padel (SPP), offering practical recommendations for both players and coaches. Once the first version of the guide was developed by six relevant researchers in padel, 11 padel experts (all with a federation title as coaches and with experience as a coach and player) conducted a qualitative and quantitative assessment of the guide. Aiken's V coefficient and confidence intervals were used to calculate content validity, and Cronbach's α coefficient to analyze reliability. The adequacy and wording of the 15 principles initially designed were evaluated. One principle was eliminated for obtaining values < 0.91 in Aiken's V coefficient regarding adequacy. The wording of the remaining principles was modified according to the qualitative assessments of the experts. The reliability of the instrument was acceptable, (α = 0.90). This guide provides a foundational list of strategic principles for padel, offering practical recommendations for players and coaches. It could also serve as a useful resource for federations to incorporate into coach education programs, supporting the development of tactical knowledge in padel.

Keywords: coaching; performance; content validity; reliability; practical applications

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1. Introduction

Padel is a socio-motor sport represented by collaboration and opposition among players, and is played in a doubles format [1]. The sport involves dynamic ball interactions [2] within a defined space, which is considered stable and well-defined [3], despite potential variations due to weather conditions and surface uncertainties [4]. As an open-skill sport characterized by unpredictability and the need for continuous decision-making [5], padel highlights the importance of cognitive abilities, perception, anticipation, and tactical skills [6].

Tactics are intricately linked to players' in-game decision-making processes, which revolve around assessing available options along with the associated risks and opportunities [7]. This relationship underscores how tactics align with players' decisions in effectively utilizing their technical, physical, and psychological resources to address the dynamic game scenarios. On the other hand, strategy can be characterized as the pre-competition plan to amplify the players' strengths and mitigate their weaknesses, minimizing opponents' strengths and exploiting their weaknesses [8].

Despite the acknowledged benefits of tactical approaches in enhancing skill execution and decision-making, which are crucial for gameplay [9], padel training for coaches has traditionally leaned towards technique-focused methodologies, also known as traditional or skill-based approaches, similar to other racket sports like tennis [10,11]. These approaches prioritize that predetermined technical skills, based on a perfect execution model, are

executed separately from the game's dynamics [12,13]. Hence, players undergo isolated skill training until achieving proficiency, facilitating their successful transition into gameplay [14,15]. Nevertheless, recent evidence suggests a potential limitation in the application of learned skills from practice to actual games [9], which may be attributed, at least in part, to the emergence of rigid techniques that hinder players from effectively addressing real-game scenarios [16]. Cognitivist and constructivist accounts of tactical proficiency are based on the player's knowledge and skill to craft and execute appropriate decisions within the constraints of the game's structure [17]. Although these perspectives identify perception, anticipation and decision-making as key constituents of tactical cognition, they place significant importance on symbolic knowledge, typically transmitted to the players through verbal instructions [18].

Other theoretical frameworks (i.e., ecological dynamics) understand that the intentional and adaptative actions of players and teams are not limited to individual processes or environmental constraints, but emerge from the reciprocal link between the two [19]. Therefore, it is on the analysis of the player-environment system that behavior and decision-making can be explained [20]. Also, regarding players' actions executed to achieve their goals, ecological dynamics make a distinction between the players' 'knowledge of' (what the players do when acting on a task) and 'knowledge about' (what players can do before acting on a task). An enhanced understanding of the game is linked to improved tactical behavior and informed decision-making in competitive scenarios, enabling athletes to achieve peak performance levels [21,22]. In this context, tactical principles of play provide a core set of guidelines that guide players and teams towards desired performance outcomes in specific phases of play [23]. However, a full account of cognition in sports must include the players' 'knowledge of', which is predicted on processes of perception–action under constraints that allow for self-organized and emergent decision-making [24,25]. Therefore, in addition to 'knowledge about' (i.e., strategic principles) a specific sport that can be transmitted to coaches and performers, it is important to address how to develop a player's attunement to key sources of information to obtain knowledge in the performance context (please see 'practical applications' section).

Padel, categorized as a net/wall game, involves projecting an object (the ball) to prevent its successful retrieval by the opposing pair [26]. Consequently, the gameplay is governed by two fundamental principles: ball placement and court positioning [27]. Given the scarcity of scientific research on SPP, the present study aims to design and validate a guide to SPP, offering practical recommendations for both players and coaches. The authors hope this guide will serve as a foundational resource for developing practice sessions, and to encourage future research on enhancing players' tactical skills.

2. Materials and Methods

2.1. Research Design

The design was classified within instrumental and ex post facto methodology [28], and the purpose of the study was to develop and validate a guide to the tactical principles of padel.

2.2. Design Expert Team of the SPP

The first version of the SPP was designed by a team constituted of 6 experts. Four of these experts hold research PhD qualifications. One of these is a PhD candidate, and the other is a level 3 padel coach. Out of these 6 experts, 4 have played padel at a high level. Furthermore, 5 of them are certified padel coaches, with 2 being coaches of professional padel players.

2.3. Expert Judges of the SPP

The choice of participants who served as expert judges in the present study was deliberate and intentional. A group of experts who met the inclusion criteria established by the researchers was selected. Expert subjects were sought who were capable of transmitting

knowledge and information about the object of study, as well as making assessments about it, which could provoke reflection and be of help to researchers [29].

The sample that participated in the validation of the guide consisted of 11 experts, who had to meet each of the established inclusion criteria: (1) to hold a federal qualification as a padel coach, (2) to be or have been a padel coach of federated and/or professional players, with a minimum of 5 years of experience, and (3) to have more than 5 years of experience as a player in federated and/or professional padel competitions.

2.4. Study Variables

In addition to the variables that made up the guide, other variables were identified to analyze the content validity and reliability of the guide. Content validity is defined as the degree to which a variable adequately represents the guide [30]. In this study, the technique used to achieve an optimal level of content validity was the assessment based on the criteria of the experts [31]. These experts assessed the suitability and writing sections of each variable through a quantitative scale from 1 to 10. Adequacy is the extent to which a variable is considered relevant and should be part of the guide. On the other hand, the working makes reference to a variable that is correctly written. Likewise, the experts made a general qualitative assessment of each element if they believed it appropriate, where they expressed their personal alternative to certain aspects that would enable an improvement. Reliability, understood as the internal reproducibility of a measure [30], was measured using Cronbach's alpha coefficient.

2.5. Instrument

An instrument was designed to assess SPP, covering items related to shot effectiveness, player movements and court positioning, teamwork and communication, identifying strengths and weaknesses, and game rhythm or pace (the ratio of actions and point duration, expressed as shots per second). Several studies have emphasized that minimizing errors is a key factor in increasing the chances of winning a match [32]. However, shot effectiveness is closely linked to other tactical variables, such as player movement and court positioning [33]. Research with professional players has shown that occupying and maintaining a position near the net significantly enhances the chances of success in padel [34,35].

Player movement on the court is also considered a crucial variable for winning points in padel [30]. For instance, using the Australian position while serving forces the server to cover more distance and move at a faster pace toward the net compared to the traditional position. In contrast, when using the traditional position, the server not only covers less distance to the net but is also closer to both the net and their side wall at the moment the opposing player hits the return [36].

Other studies have emphasized the importance of teamwork and communication in professional padel. Players are allowed to communicate with their partners both during and between points. Mutual support, sharing opinions on their performance, and providing real-time feedback on opponents' positioning can significantly enhance the chances of winning a match [37,38]. Furthermore, identifying and utilizing both their own strengths and weaknesses, while minimizing exposure to opponents' strengths, is a key strategic principle in designing tactics before and during a padel match. It is necessary to analyze these factors to gain an advantage in the game, preparing the best strategy to increase success through different strokes, ball direction and trajectories. Factors such as anthropometric characteristics, fitness levels, and hand dominance influence players' game styles and should be taken into account when preparing match strategies [39,40].

Finally, items related to shot pace and game rhythm were included in the instrument, given the relationship between these variables and performance outcomes. Factors such as court type (indoor or outdoor) and weather conditions can influence ball speed and bounce height [41]. Additionally, match score appears to impact performance indicators in professional padel. When the score is tight (e.g., during tie-breaks or golden points), points tend to last longer as players adopt a more defensive style, playing at a slower pace to

minimize the risk of errors [42]. Previous studies found game play ratios of 0.8 to 0.9 shots per second [43]. Interestingly, the intensity seems not to be affected by the set or the point duration [44,45].

Taking these variables into account, a first version of the instrument was developed. The initial definition of the 15 designed variables related to the SPP are presented in Table 1. This framework of strategic principles is intended as a guide to support padel players and coaches in understanding and applying effective strategies within the game. While these principles provide a structured approach to tactical development, they are not designed to serve as a formal evaluation tool. Instead, the framework emphasizes key competencies that enhance decision-making, coordination, and adaptability across various game scenarios.

Table 1. Strategic principles in padel. Initial version.

Strategic Principle	Description
1. Playing with consistent percentages	Play with a high margin for error to minimize unforced errors, ensuring that players prioritize safe, high-probability decisions and actions that reduce risk while maintaining pressure on the opponent.
2. Respecting the game phase	Show an attitude according to the phase of the game. That is to say, if a ball is easy to take advantage of, show an offensive attitude; otherwise, if a ball is difficult, show a defensive attitude. For example, if a player is close to the net and a very comfortable ball comes to them at a medium-high height on their forehand side, try to do some damage with their forehand volley.
3. Effective positioning	This refers to the positioning of players in relation to the ball, the net, their partner and their opponents during play. Optimal positioning allows players to maintain pressure on their opponents, create attacking opportunities and minimize vulnerability to counter-attacks. For example, on an Australian formation serve from the left side, the serving player, the right-side player, will position himself/herself close to the T. Thus, as he/she goes up to cover the net, he/she will travel a short distance. His/her partner, the player on the left, will stand at the net near the center line, as the receiver, also the player on the left, will be the one on his cross court.
4. Gaining/keeping the net	If you are already dominating the net position, maintain both the position and the initiative. That is, in addition to being located in the net position, try to ensure that the opponent cannot win the net easily; for example, by playing in such a way that the opponent cannot easily make a lob, a passing shot or a *chiquita*. If you are not dominating the net position, try to take it away from your opponents. For example, when the opportunity arises, play a deep lob that goes over the opponents, a passing shot down the line or a *chiquita* to go up to the net.
5. Moving the opponent	Make your opponents arrive at the ball uncomfortably in order to avoid stable hitting situations. Thus, it is advisable to target open spaces and execute shots that wrong-foot your opponents.
6. Seizing opportunities	Take advantage of the opportunities that may arise during the point and the match. For example, when the opponent's ball is easy, take advantage of it.
7. Teamwork/cohesion	The ability of players to collaborate effectively as a unit to achieve common goals during the match. It involves a combination of communication, understanding of each other's strengths and weaknesses, coordination in movement and positioning, and mutual support. For example, between points or on side changes, players can encourage each other and exchange opinions about the game plan to be followed.
8. Successful communication	Effective and efficient communication, both verbal and non-verbal, allows players to convey information, coordinate strategies and make quick decisions to adapt to changing situations on the court. For example, clear and early verbal communication by the non-striker can lead to better decision making and execution by his/her partner, the player who hits.

Table 1. *Cont.*

Strategic Principle	Description
9. Time management	It encompasses the ability to control how the game unfolds, changing the speed and pace of strokes to confound opponents and find opportunities. Players must know when to maintain a steady pace and when to speed up or slow down the game to surprise their opponents and take control of the situation. In addition, it refers to playing the ball in such a way that both the player and the partner are well prepared for the opponent's response. For example, a player may decide to play a lob very high if his/her partner is badly positioned so that both players are well positioned on the court.
10. Building on one's strengths and avoiding the strengths of others	It involves players in a pair identifying and using both of their own strengths, while avoiding the strengths of their opponents, in order to maximize success; for example, by trying to increase the participation of our best player by ball direction, or avoiding the best player of the rival pair.
11. Exploiting others' weaknesses and avoiding one's own weaknesses	It involves players in a pair identifying and avoiding using both of their own weak skills, while taking advantage of opponents' weaknesses, in order to maximize success; for example, by trying to lead the ball on the weakest player or avoiding hitting our worst strokes.
12. Make the opponent hit uncomfortably	The aim is to force opponents to play awkward shots, which may result in errors, weak returns or opportunities for the partner to take control of the rally and dictate play; for example, by playing fast over the opponent's body when the opponent is on the volley, or making the opponent hit after bouncing on the side court.
13. Anticipation	It involves predicting and responding predictably to the strokes, movements, intentions and tendencies of both the partner and the opposing pair during the game. For example, if the partner knows that the tendency of the opposing team on break points in their favor is to return a lob, they can anticipate their position by moving back as soon as they serve.
14. Power as a tactical weapon	Players can use power as a tactical weapon to dictate the pace of the game, overwhelm their opponents with the speed of their shots and dominate rallies. However, power must be balanced with control and precision to ensure that aggressive strokes do not lead to unforced errors, counter-attacking opportunities for opponents, or physical wear and tear that prevents them from performing at a high level. For example, players should train their athleticism to be able to hit powerful shots such as the smash, with the aim of winning many winners and conditioning their opponents' lobs.
15. Playing with deception	Players can hide their intentions to create uncertainty for their opponents. For example, from the back court, on balls where the player who is going to hit has enough time, he/she could feign with the preparation of the shot that he/she is going to play a lob and, finally, play a low shot.

It is important to note that the 15 strategic principles outlined here apply to both individual players and the team as a unit. In addition, they are not isolated or strictly linear; rather, they are interdependent and often overlap in their application. Each principle can complement and reinforce the others, and players may apply multiple principles simultaneously during gameplay. For instance, 'Playing with Consistent Percentages' is closely linked to 'Effective Positioning,' as optimal positioning enhances a player's ability to make high-percentage shots. However, while some principles are more strongly interconnected, the situational demands of the game make it challenging to specify precise relationships among all principles. This interdependence reflects the dynamic and fluid nature of tactical decision-making in padel, where the execution of one principle often supports or enhances the effectiveness of others. Likewise, some of the listed principles—such as teamwork/cohesion, successful communication, and time management—can be considered general competencies rather than strictly strategic principles. However, these competencies are overarching factors that support and reinforce other strategic principles.

2.6. Process

After a literature review, the problem statement was identified, and a guide was built that would consider the strategic principles related to padel. The first version of the SPP was designed by a team consisting of 6 expert researchers. The expert researchers individually compiled a set of strategic principles considered fundamental in padel. They then pooled them and reached a consensus. Once the first version of the SPP was defined, the researchers deliberately and purposefully selected a group of expert judges who met the established inclusion criteria. The experts were asked to assess the appropriateness of the strategic principles in terms of their relevance to padel strategy. Additionally, they provided feedback on the wording of the principles to ensure clarity, precision, and practical applicability for both players and coaches. Upon the response of the experts, the data were recorded in an Excel sheet. Quantitative data were used to calculate content validity through Aiken's V coefficient and confidence intervals and reliability from Cronbach's alpha coefficient. Qualitative data were used to improve the final writing of the guide.

2.7. Analysis of Data

Content validity was calculated using Aiken's V coefficient [46], which is used to quantify the relevance of a variable with respect to a group of experts. Its value ranges between 0.00 and 1.00, where the latter indicates a perfect agreement between the experts regarding the content evaluated. For its calculation, the Visual Basic 6.0 software developed by Merino and Livia was used, which applies the formula modified by Penfield and Giacobbi, where $\overline{X}$ refers to the mean of the scores obtained by the judges, $ı$ is the lowest value on the scale (1) and K is its range ($10 - 1 = 9$) [47,48].

$$V = \frac{\overline{X} - ı}{K}$$

Furthermore, this application makes it possible to obtain confidence intervals at the 90, 95 and 99% levels using the score method [39]. This confidence interval calculation is a confirmatory test that shows greater goodness for the creation of instruments designed for the first time [47].

To establish the criteria for elimination, modification or acceptance of variables, the initial formula proposed by Aiken was followed, applying the central limit theorem. In his calculation proposal, z = significant value of content validity; m = number of variables; n = number of experts; and c = range of the scale.

$$V = \frac{z}{0.2\sqrt{\frac{3mn(c-1)}{(c+1)}}} + 0.5$$

The criteria used by other researchers were followed when validating instruments, using the cut-off point to eliminate an item at a 95% confidence interval. When the values were between 95% and 99% confidence intervals, the items should be improved. An item is considered to be correctly designed when it has a confidence interval value greater than 99% [49,50]. This is a highly demanding criterion for the validation of a tool. Therefore, in the present investigation, variables with mean values lower than 0.87 in Aiken's V (below a 95% confidence interval) were eliminated, variables with mean values between 0.87 and <1.00 (between the 95% and 99%), and variables with mean values at 1.00 (greater than 99%) were considered correct (Table 2).

Cronbach's alpha coefficient [51] was used to analyze the reliability of the guide. Thus, Field shows that an acceptable reliability is considered from 0.70 [52], although other authors indicate that it would be more advisable to obtain values above 0.80 [53,54]. The statistical analysis was performed with SPSS v.21 software (IBM Corp. 2012. IBM SPSS Statistics for Windows, IBM Corp., New York, NY, USA).

Table 2. Criteria to be followed for acceptance, modification or deletion of variables.

		Wording		
		1.00	**[0.91–<1.00]**	**<0.91**
Adequacy	**1.00**	Correct	The wording is amended	The wording is amended
	[0.91–<1.00]	Adequacy is amended	Adaptation and wording are amended	Adaptation and wording are amended
	<0.91	The variable is deleted	The variable is deleted	The variable is deleted

3. Results

Table 3 shows the results obtained for each of the items of the instrument in terms of adequacy. It is observed that item 6 should be eliminated, because it has a lower value than 0.91 in Aiken's V, specifically 0.90. On the other hand, except for item 7, which obtained a value of 1.00 on Aiken's V and should be accepted, the rest of the items that obtained values between 0.91 and 1.00 should be modified.

Table 3. Mean, standard deviation, Aiken's V coefficient and confidence intervals results (adequacy).

Item	M(SD)	V	90% CI		95% CI		99% CI	
			Low.	Upp.	Low.	Upp.	Low.	Upp.
1	9.82(0.40)	0.98	0.94	0.99	0.93	0.99	0.90	1.00
2	9.36(1.03)	0.93	0.87	0.96	0.86	0.97	0.83	0.97
3	9.82(0.40)	0.98	0.94	0.99	0.93	0.99	0.90	1.00
4	9.73(0.90)	0.97	0.92	0.99	0.92	0.99	0.89	0.99
5	9.36(1.43)	0.93	0.87	0.96	0.86	0.97	0.83	0.97
6	9.09(1.58)	0.90	0.84	0.94	0.82	0.94	0.80	0.95
7	10.00(0.00)	1.00	0.97	1.00	0.96	1.00	0.94	1.00
8	9.73(0.65)	0.97	0.92	0.99	0.92	0.99	0.89	0.99
9	9.64(0.81)	0.96	0.91	0.98	0.90	0.98	0.88	0.99
10	9.55(0.82)	0.95	0.90	0.98	0.89	0.98	0.86	0.98
11	9.55(0.82)	0.95	0.90	0.98	0.89	0.98	0.86	0.98
12	9.64(0.92)	0.96	0.91	0.98	0.90	0.98	0.88	0.99
13	9.27(1.27)	0.92	0.86	0.95	0.84	0.96	0.81	0.96
14	9.27(1.27)	0.92	0.86	0.95	0.84	0.96	0.81	0.96
15	9.27(1.10)	0.92	0.86	0.95	0.84	0.96	0.81	0.96

M = Mean; SD = Standard deviation; V = Aiken V-coefficient; CI = Confidence interval; Low. = Lower limit; Upp. = Upper limit.

Table 4 shows the results obtained for each of the items of the instrument in terms of wording. It is observed that all the items should be modified for obtaining values in Aiken's V lower than 1.00.

Table 4. Mean, standard deviation, Aiken's V coefficient and confidence interval results (wording).

Item	M(SD)	V	90% CI		95% CI		99% CI	
			Low.	Upp.	Low.	Upp.	Low.	Upp.
1	9.36(0.92)	0.93	0.87	0.96	0.86	0.97	0.83	0.97
2	9.09(1.14)	0.90	0.84	0.94	0.82	0.94	0.80	0.95
3	9.00(1.55)	0.89	0.83	0.93	0.81	0.94	0.78	0.95
4	9.55(0.69)	0.95	0.90	0.98	0.89	0.98	0.86	0.98
5	9.27(1.01)	0.92	0.86	0.95	0.84	0.96	0.81	0.96
6	8.73(1.68)	0.86	0.79	0.91	0.78	0.91	0.75	0.93
7	9.91(0.30)	0.99	0.96	1.00	0.95	1.00	0.92	1.00
8	9.18(1.54)	0.91	0.85	0.95	0.84	0.95	0.81	0.96
9	9.45(1.21)	0.94	0.89	0.97	0.87	0.97	0.85	0.98
10	9.45(1.04)	0.94	0.89	0.97	0.87	0.97	0.85	0.98

Table 4. *Cont.*

Item	M(SD)	V	90% CI		95% CI		99% CI	
			Low.	Upp.	Low.	Upp.	Low.	Upp.
11	9.27(1.10)	0.92	0.86	0.95	0.84	0.96	0.81	0.96
12	9.64(0.67)	0.96	0.91	0.98	0.90	0.98	0.88	0.99
13	9.45(1.04)	0.94	0.89	0.97	0.87	0.97	0.85	0.98
14	9.27(1.27)	0.92	0.86	0.95	0.84	0.96	0.81	0.96
15	9.73(0.47)	0.97	0.92	0.99	0.92	0.99	0.89	0.99

M = Mean; SD = Standard deviation; V = Aiken V-coefficient; CI = Confidence interval; Low. = Lower limit; Upp. = Upper limit.

Table 5 shows, the qualitative assessments provided by the expert judges, as well as the actions that have been taken as a result.

Table 5. Qualitative evaluations by experts.

Item	Example	Action
1	- It is important to minimize errors in padel; this objective is closely linked to decision making. Not interpreting the sport well will lead you to make more mistakes. - There are many matches that are won by simply passing the ball one more time. - In padel it is advisable to have a low number of unforced errors in order not to give 'free' points to the opponent.	Play with a consistent approach, minimizing unforced errors to avoid giving 'free' points to the opponent and increase the chances of success in each exchange.
2	- Playing with order means choosing which ball to play at any given moment, whether it is offensive, defensive or neutral. - It is necessary to take advantage of opportunities to make a point when they arise and try to keep the ball in play when it arrives with difficulty. - Choosing the right moment and not rushing is essential for success. - Decision-making is fundamental in padel.	Adapt your attitude to the context of the game, taking advantage of offensive opportunities when they present themselves and opting for a defensive posture when the situation requires it. Orderly and accurate decision-making at all times is essential for success.
3	- Positioning allows you to close logical or easy spaces for your opponents. In addition, having a good dynamic disposition in terms of positioning conditions the opponent's decisions. - Covering as much space as possible in the most effective way will provide greater success in plays. - Good positioning on the court will avoid problems and give us opportunities during the game.	Effective positioning refers to the strategic positioning of players in relation to the ball, the net, their partner and opponents. Optimal positioning closes logical spaces and conditions the opponent's decisions, maximizing the chances of success.
4	- The players who spend more time at the net have a better chance of winning the point and therefore the match, so it is essential to try not to lose it and/or win it in order to achieve the objective of winning the match. - I always use the phrases: 'first I win the net and then I win the point; and when I am at the net, my first objective is not to lose it and then win the point'.	Holding or winning the net is crucial to dominating the game. Players must maintain their position at the net and make it difficult for the opponent to take control, using shots that maintain the initiative. If position is lost, it is essential to find the right moment to regain it, which will increase the chances of success on the point and ultimately in the match.

Table 5. *Cont.*

Item	Example	Action
5	- Moving the opponents on both axes is fundamental. - It is very important that the opposing players do not play comfortably in the game to prevent them from putting pressure on us; moving them is a great option that will create space and opportunities to win the point. - Try whenever possible to keep the opponents moving during their shots to reduce the quality of their shots.	Moving opponents on both horizontal and vertical axes is key to reducing the quality of their strokes and preventing them from playing comfortably. Keeping opponents moving creates opportunities to open up space and take the initiative on the point. It is crucial to adapt this approach according to the situation, alternating between keeping pressure on a specific area and changing direction to create imbalance.
7	- Work for the common good, putting individualities on the back burner. Look for effective and not extravagant points, seeking to achieve common goals and taking care of verbal/non-verbal communication. - Communication and understanding of each other's play are essential; coordination and mutual support improve performance and team cohesion.	Teamwork in padel involves effective collaboration between players to achieve common goals during the match. It is essential to understand the strengths and weaknesses of each teammate and to coordinate movements and positions to maximize joint performance. Prioritizing the common good over the individual, and adjusting strategies according to the circumstances of the game, are essential to maintain cohesion and improve team results.
8	- Effective communication is key to guiding the partner and improving execution during the point, keeping both players attentive and coordinated. - Clarity and brevity in communication allows for quicker and more effective decision-making in changing situations. - Communication must be effective not only during play, but also in time-outs and adverse situations to maintain focus and cohesion. - Knowing each other well and having pre-defined communication strategies is crucial to handle both the positive moments and challenges of the match.	Successful communication in padel is essential to convey information clearly and concisely, facilitating the coordination of strategies and adapting to changing situations. An effective exchange of messages, whether verbal or non-verbal, helps to improve decision making and execution during the point. In addition, maintaining consistent and well-defined communication during breaks and critical moments in the match reinforces team focus and cohesion, ensuring that both players are aligned in their goals and responses to challenges.
9	- The change of pace is important both when defending and attacking. Knowing how to change in defense gives you the option to return to your court position and in attack to be able to create doubts and cause a free ball to be returned to you. - This is an aspect that defines great tactical players. They know how to read the tempo of the match, depending on the characteristics of their opponents, themselves, or their teammate. - Handling different speeds and/or rhythms during the game will make us less predictable, and even generate time when we need it.	Time management in padel involves adjusting the speed and pace of strokes to confuse opponents and take control of the game. Players must be able to alternate between steady rhythms and quick variations to create opportunities and adapt to changing conditions. This ability to adjust the tempo of the game, based on reading the situation and the behavior of the opponent, maintains unpredictability and maximizes control over the point.
10	- Trying to take the match to where you are strongest and identifying other players' strengths in order to neutralize them. - This is an essential tactical principle, seeking to maximize what the team does well, and avoiding throwing the ball into dangerous opponent's hitting areas. - Maximizing our own strengths and minimizing those of our opponents is the key to success. We must know how to identify them in time to avoid their best moves and/or shots.	This principle is based on the pair's ability to exploit their strengths to the maximum while avoiding their opponent's. It is crucial to identify and exploit one's own strengths, such as a specific stroke or tactic, while avoiding areas or moves where the opponent feels more comfortable. It is crucial to identify and exploit one's own strengths, such as a specific stroke or tactic, while at the same time avoiding areas or moves where the opponent feels more comfortable. Adapting your game according to this strategic analysis will maximize your success in the match.

Table 5. *Cont.*

Item	Example	Action
11	- The aim is to reduce our weakest shots with common sense, avoiding creating disadvantageous situations. We will try to hit the ball at the weakest or neutral shots of our opponents. - The key to success lies in minimizing our weaknesses and taking advantage of our opponents' weaknesses.	This principle focuses on a team's ability to identify and avoid their own weaknesses while taking advantage of their opponent's. Minimizing one's own limitations, such as a less effective stroke or weak court position, is as important as attacking the opponent's most vulnerable areas. Minimizing one's own limitations, such as a less effective stroke or a weak court position, is as important as attacking the opponent's most vulnerable areas. This dual strategy allows the pair to reduce risks and maximize opportunities during the match.
12	- If the opponent is uncomfortable, we will probably get an error or an open ball to press and close the point. This can be achieved not only by moving the opponents, but also with different strokes that make them uncomfortable. - It is very important to discover the areas where you can create discomfort for your opponents in order to dominate the point.	This tactical principle seeks to create situations in which the opponents hit in uncomfortable conditions, which increases the chances of errors or weak returns that allow the team to take control of the point. The discomfort could be created by putting pressure on the opponent's body with quick shots or by forcing them to play from unfavorable positions.
13	- Analyzing the opponent's shots in advance provides extra time that makes it easier to get to the ball in a better condition or to prepare an effective counter-attacking move. - The ability to anticipate plays is a sign of tactical intelligence and advanced reading of the game. Players who can anticipate what will happen often have a significant advantage on the court. - This principle is linked to knowledge of the game and its basic geometry. Anticipation is based on remembering habitual patterns and moves of opponents, which allows one to foresee the most likely hitting options and prepare the appropriate response.	Anticipation is a key tactical skill that allows players to predict the opponent's next moves and respond proactively. It involves analyzing and remembering patterns of play, which facilitates the preparation of a more effective and quicker response. This ability to anticipate not only improves court position, but also increases the chances of dominating key points. Anticipation is a combination of tactical intelligence, concentration and reading the game, which gives players extra time to make strategic decisions.
14	- Power can be trained, but it will not always be the best weapon for all players; sometimes it is better to put pressure on with your legs. - Being an aggressive player, but at the same time consistent, makes you a great player who can condition your opponents.	Power is a tactical tool that allows players to put pressure on their opponents with fast strokes and generate opportunities for winning points. However, its effectiveness depends on finding the right balance between power, control and consistency. Not all players need to base their game on power, and in many cases, the key is to complement it with good technique and strategy, prioritizing control over risk. Being able to combine power and precision, and knowing when and how to use it, is what allows players to destabilize their opponents and take control of the game without exposing themselves to unforced errors or excessive physical wear and tear.
15	- Include deception as a task to deactivate the opponent's ability to anticipate in order to try to break the logic and control the rhythms of the points. - It is good to always have a weapon in reserve to be able to use at important moments to create confusion. - Timing is everything in padel. If you are able to feint, you are taking time away from your opponent's decision making. - This is an important principle for advanced players, where the opponents are not able to anticipate and take advantage of the shots that are executed.	Deception is a key strategy to create uncertainty in the opponent, reducing their reaction time and making it difficult for them to anticipate shots. Varying shots and hiding intentions until the last moment allow the player to take control of the point and surprise the opponent. This involves mastering different preparations and strokes, such as feinting with a lob and then executing a low shot. The ability to use deception at decisive moments can be the difference between winning or losing a point, especially in advanced level matches, where any tactical advantage counts.

Finally, Table 6 collects the values obtained in the reliability of the tool with Cronbach's α coefficient.

Table 6. Reliability analysis of the instrument.

	Adequacy	Wording	Total
α	0.94	0.84	0.90
Valid	15	15	30

4. Discussion

The purpose was to design and validate a guide to SPP with guarantees of validity and reliability, as well as to provide practical recommendations for both players and coaches. A tool (Appendix A) has been generated that records 14 principles, that can be used and followed by padel coaches for the development of their players. Additionally, federations can take it into account in their training programs.

Only a few studies have focused on the validation and design of instruments for padel [55–58]. These studies primarily focus on observational tools that address technical-tactical evaluation [58], finishing actions, different strokes used by padel pairs to approach the net and their impact on subsequent strokes (Net Approach in Padel Observational Analysis, NAPOA) [55], or the smash (Observational Analysis of the Smash in Padel, OASP) [48]. Consequently, the guide developed in the present research on SPP represents a pioneering contribution.

Dunn et al. and Bulger & Housner establish a number of basic criteria for successful validation: (i) the criteria for selecting the expert judges; (ii) the number of judges comprising the expert panel; (iii) the procedure used by the judges to assess content validity; (iv) the statistical or quantitative procedures for evaluating the judges' scores; and (v) the selection criteria used to determine whether variables are retained, modified or removed from the final proposal of variables to be included in the instrument [31,59]. The discussion of the results will follow these five phases. In addition, the results of the internal consistency of the instrument will be confronted.

The criteria for the selection of the group of experts have been rigorously defined for this study. All the expert judges had to hold a federal qualification as a padel coach and be or have been a padel coach of federated and/or professional players, with a minimum of five years of experience. In addition, they had to have more than five years of experience as a player in federated and/or professional padel competitions. Criteria similar to those used in this research have been used by other researchers for the validation of their instruments [50,56,60]. For example, Escudero-Tena et al., as in the present research, used criteria in the professional line such as possessing a federal qualification and practising or having practised as a coach [55,57]. The inclusion criterion of meeting 80% or more of the inclusion criteria to be one of the expert judges has also been used in other research of this nature [49,56]. In the present research, all expert judges met all the inclusion criteria. Therefore, the quality of the expert judges participating in the study guarantees that the opinions expressed are of sufficient rigor and quality for the final validity of the guide.

Bulger and Housner and Dunn et al. reflect on the number of components that make up the expert group. Several sport-specific studies show that 10 or more subjects provide an acceptable estimate for the content validity of a validation instrument [60–62]. The present research meets this requirement, as it has the assessment of 11 experts. Therefore, the contributions of these expert judges are sufficient for the validation of this guide in both quantity and quality.

The expert judges conducted a quantitative and a qualitative assessment of each of the SPP, a procedure similar to those used in other studies [49,55,56].

For the statistical or quantitative procedures, a very demanding criterion was followed, used by other researchers for the assessment of content validity [56,60,63]. Using the cut-off point to eliminate a principle at 95% confidence, one of the 15 principles was eliminated (6. seize opportunities). It reached values below 0.91 on Aiken's V coefficient

for appropriateness. The expert judges considered that this principle should not be part of the construct of SPP.

When the values were between 95% and 99% confidence, the principles were improved. Therefore, the rest of the principles were modified by obtaining values $\geq$ 0.91–<1.00 in Aiken's V coefficient in the adequacy or wording. For their modification, the qualitative assessments of the experts were taken into account, which was indispensable for the final elaboration of the guide [31,64]. The changes can be seen by comparing the right-hand columns of Tables 1 and 5.

Finally, a principle is considered to be correctly designed when it has a value higher than 99% confidence [49,50], i.e., when the Aiken's V coefficient is 1.00. However, no principle in the present guide obtained such a demanding coefficient.

The results obtained show that the guide is reliable, reaching values higher than those set by the experts [53,54]. Studies that perform validations for the analysis of sport [55,56], referees [63], or for the training of athletes [65], also reach optimal reliability values using the same procedure as in this research. Therefore, this guide is considered to be reliable; i.e., it has sufficient internal consistency.

4.1. Strengths

This study presents several strengths. First of all, the panel of experts who designed the first version of the guide was composed of four PhD researchers, one PhD candidate, and one level 3 padel coach (the highest qualification in Spain). Out of these six experts, five of them are certified padel coaches with experience in coach education. In addition, three of them played at a high level, and two of them have coached professional padel players. Secondly, this is a pioneering study, since in an open-nature sport such as padel, strategy and tactics play a crucial role in determining success, and research is scarce in this field.

4.2. Limitations and Future Studies

It is important to acknowledge certain limitations in interpreting the results. The panel of expert coaches who served as judges was only composed of 11 Spanish coaches. Future studies should consider including coaches from other nationalities.

4.3. Practical Applications

To practically address the SPP, coaches should consider concepts of representative task design [66–68], functional variability [69–71], reducing conscious control of movement [72,73], and the synergetic behavior of sports teams [74–76].

Representative task design is predicated on practice situations that allow for processes of perception–action similar to the performance context [59]. Therefore, tasks should contribute to educating players' attention to relevant information that guides their actions in competition [77]. By manipulating task constraints, coaches can design contexts to facilitate discovery, exploration and exploitation of functional movement solutions [78]. The behavior emerges as a result of the constraints designed by the coaches. For example, by setting a limit of unforced errors in 1 $\times$ 1 or 2 $\times$ 2 tasks done in competition mode (e.g., competition to 10 points but the player who reaches the limit of unforced errors first loses immediately), coaches can encourage players to pace themselves and find 'safer' spatio-temporal solutions for their shots. This contributes to improving the SPP of 'playing with consistent percentages'. Important to this example is that the limited number of unforced errors should be based on referenced numbers based on the player's level. Task constraints should also be used to facilitate perception of relevant information and create opportunities for action (affordances). For example, consider a 2 $\times$ 2 task with the attackers' movements constrained (e.g., forbidding areas of the court they can move to, or shots they can make) to promote perception of opportunities for the defending team to transition and encourage players to perceive an opponent's constraints. This specific task constraint will simultaneously help develop the SPP of 'respecting the game phase', 'seizing opportuni-

ties', 'exploiting others' weaknesses and avoiding one's own weaknesses' and 'make the opponent hit uncomfortably'. The SPP 'playing with deception' highlights the importance of a training process based on perception–action capabilities. A very important concept when using a Constraints-Led Approach (CLA) to skill acquisition is task simplification [78]. Task simplification implies reducing complexity while maintaining relevant information from the performance context. We can argue that in padel, the opponent's movement and positioning, the net, and the existing limited space of play are key information that players consider in order to organize their own actions. Coaches can constrain space, actions or the number of players while maintaining this key information. The training process will normally have more and less representative tasks; however, coaches should carefully manage the total volume of each.

Movement variability is a key aspect of expert performance [79] and closely related to adaptability and creativity [80,81]. Although coaches should infuse task variability to promote adaptable, creative players, it is important to constrain and adapt variability to task goals and players' levels [82]. In 'open' exercises variability is ensured by the very nature of the task; however, in more 'closed tasks', coaches can find strategies to guarantee the appropriate variability (i.e., adapted to players' levels and practice goals). For example, if designing a task with targets to direct the players' shots, there should be more than one target. Also, other strategies include performing the same task with a different number of players, using different ball brands in the same exercise, promoting small adaptations of the same shot in one task, training in different locations (indoor vs. outdoor), and feeding (in basket exercises) the task with different ball velocities, effects and heights. This key feature of task design should be considered when training any of the SPP.

Focusing instructions and feedback on the external effects of players' actions rather than on internal movement processes contributes to higher levels of performance [83]. Directing a player's attention to relevant information, questioning the perceptual process associated with specific decisions, and encouraging players to focus on the results of their actions are strategies that coaches can use to promote higher levels of skill acquisition [84]. Although focusing on body parts used in a player's actions will be necessary in any sport, traditional training methodologies excessively rely on this strategy thereby promoting decontextualized practice situations [85]. For example, to address the SPP of 'make the opponent hit uncomfortably' coaches should predominantly guide the player's attention to locations, and ball speed/effect/rebound/height that accomplish the goal. Another example regarding the SPP 'power as a tactical weapon' involves questioning (instead of giving solutions) players about the situations when power shots should be taken and allowing them to explore different solutions. An external focus of attention can be a priority strategy to train all the SPP, regardless of the technical feedback that the coaches consider necessary.

Padel is a team sport, and therefore practice should address interpersonal synergetic behavior [86]. When designing tasks that allow for specific opportunities of action (affordances) the concept of shared affordances [87] should be considered. Players in a team can coordinate their actions by collectively perceiving and using affordances (e.g., perceiving an opponent's weakness), by providing affordances for others (e.g., a player making a shot to a location that offers an advantage to his partner), and by perceiving the affordances of others (e.g., a player perceives that his partner has an opportunity to play an aggressive shot) [88]. Coaches can design tasks to encourage synergetic behavior expressed in higher levels of team synchronization [89], increase the capacity to adapt and compensate for other actions [76], clarify the contribution of each player [90], and increase the adaptability of players as part of a team [91]. Some SPP (teamwork/cohesion, successful communication, time management) are evidently related to a team's synergies and their properties; however, all SPP should be regarded as a collective goal. Evidence suggests that a team with players educated to consider the same relevant information has higher levels of performance than teams that pre-determine their actions [92]. Therefore, higher levels of team synchronization can be achieved by collectively guiding players' attention. For example, for 'successful

communication' both players should consider the same key information (an opponent's actions and location or spaces to play) when informing each other. Coaches can promote tasks with players starting in an unfavorable positioning and encourage them to explore how to 'rebalance' the team structure. These tasks will contribute to improving the SPP of 'teamwork/cohesion' and 'effective positioning' as well as developing team adaptability.

Considering this theoretical framework, coaches and players can draw from the examples provided and further explore representative task designs to improve the SPP both at individual and collective levels. However, planning and periodizing are also key factors in athletes' performance [93]. In sports that have frequent moments of formal competition, planning should be flexible and based on regular assessments [94]. Padel coaches that want to plan and periodize training of SPP should consider the following: (i) flexible planning; (ii) regular assessment; (iii) integrating different SPP; (iv) integrating the different parts of the training session; and (v) varying the order of task complexity. Some examples of these considerations are as follows:

(i) Flexible planning is not contrary to long-term planning. Coaches can plan the entire season by using traditional units of periodization (i.e., macrocycle, mesocycle and microcycle) and prioritize the SPP to be trained at each moment. For example, prioritize for 4–6 weeks (mesocycle) 'playing with consistent percentages' and "time management" and plan how every week (microcycle) will contribute to the mesocycle goals. Also, the goals of each mesocycle should contribute to achieving the macrocycle (e.g., a season) goals. However, it is fundamental that coaches are receptive to frequently adapting and changing their planning based on regular assessments. Recent noteworthy work has been done on the topic of skill acquisition periodization [95,96] and we encourage padel coaches to know and incorporate these models of periodization.

(ii) Regular assessments will provide coaches with objective data to inform their planning and eventual adaptations to be made. In competitive players, information is provided mostly from game statistics. In this case it is important to gather sufficient data to observe tendencies, strengths and weaknesses. In recreational players and beginners, the coach should plan for assessment sessions and therefore have regular monitoring of the player's development.

(iii) Integrate different SPP by considering the game's structure. Although there are SPP transversal to every phase of the game (e.g., teamwork/cohesion), some have a predominance in the same game sub-phase. For example, 'seizing opportunities' and 'power as a tactical weapon' can easily be SPP goals in the same training task. We can argue that by integrating the SPP considering the game structure, coaches are already designing more representative training sessions.

(iv) Integrate the different parts of the training session according to the SPP to be trained. Introductory, main and final phases of the training session should be based on similar processes of perception–action and should obviously relate to practice goals (SPP). For example, if the SPP to be trained are 'gaining/keeping the net' and 'moving the opponent', the warm-up, 1×1, 2×2 or game practice situations of the same session should encourage players to perceive 'open' spaces and opponents' intentions.

Vary the order of task complexity. Traditional training usually relies on increasing task complexity throughout the training session. However, in the constraints-led approach, task complexity can go back and forth throughout the session; for example, practicing first a more 'open' and random task interspersed with simplified versions to address specific details of the main task goal.

5. Conclusions

Once the relevant modifications advised by the group of expert coaches had been made to all the items, a new proposal for the guide was drawn up. The final SPP guide is made up of 14 principles. The inclusion of all these principles makes the guide a complete, reliable and valid instrument that can be used by padel players, coaches and federations.

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Appendix A

Table A1. Strategic principles in padel. Final version.

Strategic Principle	Description
1. Playing with consistent percentages	Play with a consistent approach, minimizing unforced errors to avoid giving 'free' points to the opponent and increase the chances of success in each exchange.
2. Respecting the game phase	Adapt your attitude to the context of the game, taking advantage of offensive opportunities when they present themselves and opting for a defensive posture when the situation requires it. Orderly and accurate decision-making at all times is essential for success.
3. Effective positioning	Effective positioning refers to the strategic positioning of players in relation to the ball, the net, their partner, and their opponents. Optimal positioning closes logical spaces and conditions the opponent's decisions, maximizing the chances of success.
4. Gaining/keeping the net	Holding or winning the net is crucial to dominating the game. Players must maintain their position at the net and make it difficult for the opponent to take control, using shots that maintain the initiative. If position is lost, it is essential to find the right moment to regain it, which will increase the chances of success on the point and ultimately in the match.
5. Moving the opponent	Moving opponents on both horizontal and vertical axes is key to reducing the quality of their strokes and preventing them from playing comfortably. Keeping opponents moving creates opportunities to open up space and take the initiative on the point. It is crucial to adapt this approach according to the situation, alternating between keeping pressure on a specific area and changing direction to create imbalance.
6. Teamwork/cohesion	Teamwork in padel involves effective collaboration between players to achieve common goals during the match. It is essential to understand the strengths and weaknesses of each teammate and to coordinate movements and positions to maximize joint performance. Prioritizing the common good over the individual, and adjusting strategies according to the circumstances of the game, is essential to maintain cohesion and improve team results.
7. Successful communication	Successful communication in padel is essential to convey information clearly and concisely, facilitating the coordination of strategies and adapting to changing situations. An effective exchange of messages, whether verbal or non-verbal, helps to improve decision-making and execution during the point. In addition, maintaining consistent and well-defined communication during breaks and critical moments in the match reinforces team focus and cohesion, ensuring that both players are aligned in their goals and responses to challenges.

Table A1. *Cont.*

Strategic Principle	Description
8. Time management	Time management in padel involves adjusting the speed and pace of strokes to confuse opponents and take control of the game. Players must be able to alternate between steady rhythms and quick variations to create opportunities and adapt to changing conditions. This ability to adjust the tempo of the game, based on reading the situation and the behavior of the opponent, maintains unpredictability and maximizes control over the point.
9. Building on one's strengths and avoiding the strengths of others	This principle is based on the pair's ability to exploit their strengths to the maximum while avoiding their opponent's. It is crucial to identify and exploit one's own strengths, such as a specific stroke or tactic, while at the same time avoiding areas or moves where the opponent feels more comfortable. Adapting your game according to this strategic analysis will maximize your success in the match.
10. Exploiting others' weaknesses and avoiding one's own weaknesses	This principle focuses on a team's ability to identify and avoid their own weaknesses while taking advantage of their opponent's. Minimizing one's own limitations, such as a less effective stroke or weak court position, is as important as attacking the opponent's most vulnerable areas. This dual strategy allows the pair to reduce risks and maximize opportunities during the match.
11. Make the opponent hit uncomfortably	This tactical principle seeks to create situations in which the opponents hit in uncomfortable conditions, which increases the chances of errors or weak returns that allow the team to take control of the point. The discomfort could be created by putting pressure on the opponent's body with quick shots or by forcing them to play from unfavorable positions.
12. Anticipation	Anticipation is a key tactical skill that allows players to predict the opponents' next moves and respond proactively. It involves analyzing and remembering patterns of play, which facilitates the preparation of a more effective and quicker response. This ability to anticipate not only improves court position, but also increases the chances of dominating key points. Anticipation is a combination of tactical intelligence, concentration and reading the game, which gives players extra time to make strategic decisions.
13. Power as a tactical weapon	Power is a tactical tool that allows players to put pressure on their opponents with fast strokes and generate opportunities for winning points. However, its effectiveness depends on finding the right balance between power, control and consistency. Not all players need to base their game on power, and in many cases, the key is to complement it with good technique and strategy, prioritizing control over risk. Being able to combine power and precision, knowing when and how to use it, is what allows players to destabilize their opponents and take control of the game without exposing themselves to unforced errors or excessive physical wear and tear.
14. Playing with deception	Deception is a key strategy to create uncertainty in the opponent, reducing their reaction time and making it difficult for them to anticipate shots. Varying shots and hiding intentions until the last moment allow the player to take control of the point and surprise the opponent. This involves mastering different preparations and strokes, such as feinting with a lob and then executing a low shot. The ability to use deception at decisive moments can be the difference between winning or losing a point, especially in advanced level matches, where any tactical advantage counts.

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