

MHSalud

Revista en Ciencias del Movimiento Humano y Salud

Doi <https://doi.org/10.15359/mhs.21-2.19604>

Saving Penalties in Football: A Skill Beyond Chance

Atajar penaltis en el fútbol: Una
habilidad más allá del azar

Defendendo Pênaltis no Futebol:
Uma Habilidade Além da Sorte

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Recibido 23-10-2023 - Aceptado 07-10-2024

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VERSIÓN PRELIMINAR

ABSTRACT

The ability of goalkeepers to stop penalty kicks in football has often been interpreted as a matter of luck or chance. However, scientific evidence refutes this notion, demonstrating that the skill and experience of the goalkeeper have a significant impact on the final outcome. This essay seeks to highlight the importance of attention, reaction, agility, and anticipation in football goalkeepers during penalty kicks, placing greater emphasis on anticipation over luck and chance in these critical moments of the game. The arguments and analyses presented here are supported by scientific studies, audiovisual material, and sports data. It is noteworthy that experienced goalkeepers are considerably more effective in stopping penalties than their less experienced counterparts. This skill can be enhanced through training focused on visual perception. Expert goalkeepers can discern multiple sources of information during the opponent's movement, allowing them to accurately anticipate the ball's trajectory. Furthermore, there are recommended strategies to improve performance in penalty kicks, such as specific visual perception training, detailed analysis of opponent shots, identification of kinematic patterns in kicks, and maintaining body language that denotes mastery. In conclusion, the ability to stop penalties should not be solely attributed to luck, as experience, skill, and training play a fundamental role in the goalkeeper's performance in these crucial game situations.

Keywords: Anticipation psychological, soccer, sports

RESUMEN

La capacidad de los porteros para detener los lanzamientos de penalti en el fútbol ha sido, a menudo, interpretada como una cuestión de suerte o azar. Sin embargo, la evidencia científica refuta esta noción, demostrando que la destreza y experiencia del portero tienen un impacto significativo en el resultado final. Este ensayo busca destacar la importancia de la atención, reacción, agilidad y anticipación en los porteros de fútbol durante los tiros penales, otorgando mayor énfasis a la anticipación, sobre la suerte y el azar, en esos momentos críticos del juego. Los argumentos y análisis aquí presentados se sustentan en estudios científicos, material audiovisual y datos deportivos. Es notable que los porteros con experiencia son considerablemente más efectivos en detener los penaltis que aquellos menos experimentados. Esta habilidad puede ser mejorada a través del entrenamiento enfocado en la percepción visual. Los porteros expertos son capaces de discernir múltiples fuentes de información durante el movimiento del oponente, lo que les permite anticipar, con precisión, la trayectoria del balón. Además, existen estrategias recomendadas para mejorar el rendimiento en los penales, como el entrenamiento específico de la percepción visual, el análisis detallado de los tiros del oponente, la identificación de patrones cinemáticos en los lanzamientos y el mantenimiento de un lenguaje corporal que denote dominio. En conclusión, la habilidad para detener penaltis no debe ser atribuida, exclusivamente, a la suerte, ya que la experiencia, habilidad y entrenamiento juegan un papel fundamental en el desempeño del portero en estas situaciones cruciales del juego.

Palabras clave: Anticipación psicológica, deportes, fútbol

RESUMO

A habilidade dos goleiros de defender pênaltis no futebol muitas vezes tem sido interpretada como uma questão de sorte ou acaso. No entanto, evidências científicas refutam essa ideia, demonstrando que a habilidade e a experiência do goleiro têm um impacto significativo no resultado final. Este ensaio busca destacar a importância da atenção, reação, agilidade e antecipação nos goleiros de futebol durante os pênaltis, dando maior ênfase à antecipação em relação à sorte e ao acaso nesses momentos críticos do jogo. Os argumentos e análises apresentados aqui são apoiados por estudos científicos, material audiovisual e dados esportivos. Vale ressaltar que goleiros experientes são consideravelmente mais eficazes na defesa de pênaltis do que seus colegas menos experientes. Essa habilidade pode ser aprimorada por meio de treinamento focado na percepção visual. Goleiros especialistas conseguem discernir múltiplas fontes de informação durante o movimento do adversário, permitindo-lhes antecipar com precisão a trajetória da bola. Além disso, existem estratégias recomendadas para melhorar o desempenho nas cobranças de pênalti, como o treinamento específico de percepção visual, análise detalhada dos chutes do adversário, identificação de padrões cinemáticos nas cobranças e a manutenção de uma linguagem corporal que denote domínio. Em conclusão, a habilidade de defender pênaltis não deve ser atribuída unicamente à sorte, já que a experiência, a habilidade e o treinamento desempenham um papel fundamental no desempenho do goleiro nessas situações cruciais do jogo.

Palavras-chave: Antecipação psicológica, futebol, esportes

Introduction

Football is a sport that requires players to cover long distances on the field while executing various activities such as accelerations, decelerations, changes of direction, and jumps. The ability to make quick and powerful movements is crucial for improving athletic performance in football and other team sports (Beato *et al.*, 2022).

However, physical attributes alone, such as strength, endurance, and flexibility, are not the sole determinants of athletic performance. Studies have shown that attention, anticipation, and reaction play significant roles in multiple sports (Castellar *et al.*, 2019; Vaughan & Laborde, 2021; Jin *et al.*, 2020). Fatigue, for example, has been found to compromise reaction time and decision-making in mixed martial arts athletes, directly impacting their performance (Pavelka *et al.*, 2020).

Therefore, attention, anticipation, and reaction should not be underestimated as they are closely linked to athletic performance. In football, these abilities are crucial in determining the outcome of plays and even the final scoreline. Situations such as intercepting an opponent's pass, executing a long pass based on teammates' positioning, reacting to quick dribbles, and maintaining focus on the ball's trajectory amidst distractions require these capacities.

A football scenario that invariably captures the attention of the audience and demands exceptional skills is the execution of penalty kicks. In this setting, the goalkeeper faces the task of anticipating the direction of the shooter's kick and intercepting the ball to prevent it from penetrating the net, with a combination of agility and speed. Penalties, aside from representing a test of technical skill for the involved players, also evoke intense intrigue and excitement as they can be decisive in the final outcome of a match. The introduction of penalty shootouts, composed of five kicks per team, to determine the winner when neither team manages to surpass the other in goals during regulation time, marked a significant change in the rules of the game. In contrast to previous methods such as flipping a coin, this innovation not only added an additional element of excitement and suspense but also elevated the entertainment value associated with football (Csató, 2020).

Some football figures argue that the success of penalty shootouts relies heavily on luck. Carlos Queiroz, the former coach of the Colombian national football team, stated after their loss to the Chilean national team in the 2019 Copa America, "Penalties are and always will be a matter of luck. Today, luck was not on our side" (Gol Caracol, 2019). Martín Palermo, an Argentinean coach and former footballer, expressed a similar belief

in 2013, stating that penalties are spur-of-the-moment decisions and rely on luck ([Fútbol para todos, 2013](#)). Ricardo Caruso Lombardi, a former football player and coach, attributed the poor performance of the Tigres football club in the Argentine Super League to their lack of luck, even in penalties, during a 2017 interview ([Botingol TV, 2017](#)).

While luck is acknowledged to some extent, these figures also credit the success of penalty shootouts to the skills of the goalkeeper. Luis Enrique Martínez, the former coach of the Spanish national football team, attributed Spain's loss in a penalty shootout against Morocco in the 2022 FIFA World Cup to the exceptional skills of Moroccan goalkeeper Yassine Bounou, who saved 2 penalties ([Fútbol Por Minuto, 2022a](#)). Lionel Messi, a renowned football player, praised the Argentine goalkeeper Emiliano Martínez after defeating the Netherlands in a penalty shootout during the 2022 FIFA World Cup, stating that they have an advantage with him in goal ([Fútbol Por Minuto, 2022b](#)).

This uncertainty raises the question of whether saving a penalty kick relies purely on luck or if it involves the goalkeeper's skills such as attention, reaction, agility, and anticipation. However, it is intriguing to consider that these abilities may play a significant role in penalty saves.

This essay aims to emphasize the importance of attention, reaction, agility, and anticipation in football goalkeepers during penalty kicks, focusing on anticipation rather than luck and chance in penalty shootouts. The arguments and discussions presented in this text draw support from scientific articles, video archives, and sports statistics.

Are there expert goalkeepers in saving penalties?

Some individuals perform tasks more effectively and efficiently than others, exhibiting superior execution and higher task performance. This is particularly evident in sports, where certain athletes outshine their peers. In the 2021-2022 UEFA Champions League, Thibaut Courtois, Real Madrid's goalkeeper, made seemingly impossible saves in multiple matches ([AMA Football Channel™, 2022](#); [Real Madrid C.F., 2022](#)). He concluded the tournament with 59 saves, 59.32% of which were shots taken from inside the penalty area. Additionally, he successfully saved the only penalty he faced ([Diario Marca, 2023](#)). Despite the statistical likelihood of saving a penalty being lower than scoring, with a 70% chance of success for the opposing player ([Fariña, Fábrika, Tambusso & Alonso, 2017](#)), doubts arise regarding the existence of goalkeepers with greater expertise in saving penalties.

Attention and anticipation play a vital role, as a goalkeeper's ability to anticipate the shot's direction is influenced by their perception of the penalty taker's kinematic

information (Müller & Abernethy, 2012). Anticipation experts can gather and retain more information about their opponents within the same timeframe, enabling them to process probability data and anticipate shot direction. Consequently, experts have access to more information sources and tools that aid their anticipation.

Recent research (Smeeton, Meyer & Klatt, 2023) assessed the ability to anticipate penalty shot direction in professional and recreational players. Participants viewed a sequence of four frames depicting a soccer player kicking the ball at different time points (160 and 80 milliseconds before kicking, at the moment of foot-ball contact, and 80 milliseconds after kicking). They were then required to rapidly select the anticipated ball location. Expert players demonstrated significantly higher accuracy and confidence in predicting the shot's direction.

Similarly, another study compared the accuracy of professional and novice goalkeepers in predicting the ball's direction (Wang, Ji & Zhou, 2019). Videos of penalty kicks were presented under two conditions: one allowing identification of pre-kick signals from the shooter and the other limiting signal availability. Expert goalkeepers exhibited substantially higher accuracy in both conditions compared to novices.

Petr Čech's performance in the 2011-2012 UEFA Champions League final serves as an exemplar. He correctly anticipated all five penalty kicks by Bayern Munich, saving two (ESPN Deportes, 2020). This success resulted from comprehensive analysis of Bayern Munich's penalty kick videos from 2007 to 2012, repeated study of each video, and identification of routines and motor actions indicating shot direction with assistance from the club's sports psychologist. Čech underwent three weeks of training to memorize and recognize opponents' patterns (Le CERA, 2020).

Another notable instance occurred during the 2014 FIFA World Cup quarter-finals when Netherlands coach Louis Van Gaal substituted goalkeeper Jasper Cillessen with Timothy Michael Krul minutes before the end of extra time. Krul, known for his penalty-saving ability, accurately anticipated the trajectory of all opposing team penalty kicks and saved two (FIFA, 2022).

Although further comprehensive studies on goalkeepers' attention and anticipation during penalties are required, these scientific findings and video analyses demonstrate the presence of goalkeepers with superior skills for saving penalty shots.

Moreover, anticipatory ability can be enhanced through visual and perceptual training, allowing athletes to gather more opponent and environmental information. One study illustrated how visual perception training using penalty kick frames improved goalkeepers' ability to anticipate shot direction compared to a control group. Sessions

projected penalty kick frames from the goalkeeper's perspective, enabling identification of movement patterns revealing the shooter's chosen direction (Pashabadi *et al.*, 2019). Another study enhanced the anticipation of three inexperienced goalkeepers by analyzing the angle between the shooter's supporting foot and the ball, a primary predictor of shot direction visible from the goalkeeper's viewpoint (Torres, 2022). Similar benefits have been observed in cricket, where visual perception training using frames significantly improved the anticipatory abilities of batters (Brenton, Müller & Harbaugh, 2019).

Furthermore, it is important to note that improving anticipatory skills necessitates constant repetition in realistic game scenarios. Additionally, the ability to anticipate a specific sports movement does not transfer to other gestures or sports practices. A study found low capacity for anticipating the ball's direction during a penalty kick among rugby, basketball, lacrosse, hockey, or netball players (Andrew & Causer, 2022). Therefore, anticipation skills acquired for penalty kicks are specific to soccer goalkeepers who have developed expertise through experience and repetition in that particular task. If a soccer goalkeeper were to anticipate other sports events, such as a football pass, a handball shot, or an ice hockey penalty shot, specific training for those tasks would be required.

Considering the aforementioned evidence, it can be affirmed that expert goalkeepers capable of saving penalties do exist. These athletes excel in retaining and processing information about their surroundings and opponents' movements to anticipate the ball's trajectory. Visual perception training contributes to the development of highly skilled goalkeepers in saving penalty shots.

How can goalkeepers improve penalty shootout effectiveness?

In the previous section, visual perception training was mentioned as a strategy to enhance goalkeepers' performance during penalty kicks. This section will discuss key aspects to improve soccer goalkeepers' effectiveness in penalty shootouts.

Goalkeepers have two choices when it comes to diving to either side of the goal: they can hastily launch themselves to one side and rely on luck to predict the ball's trajectory, or they can hold their position as long as possible, gathering more information to anticipate the ball's path.

A study analyzing penalty kicks from the FIFA World Cup and UEFA European Championships between 1984 and 2016 found that professional goalkeepers prefer to initiate their movement late, holding their position for an additional 160 milliseconds before the opponent's foot contacts the ball (Noël, van der Kamp & Klatt, 2021). This

strategy allows experienced goalkeepers to gather crucial information about the opponent's shooting intentions (Hunter *et al.*, 2018). The swinging motion of the kicking leg just before ball contact provides 76.1% and 80.7% reliable information, while the moment of foot-ball contact contributes 98.4% trustworthy information (Diaz, Fajen & Phillips, 2012). Consequently, experienced goalkeepers hold their position longer to collect that 98.4% of reliable information, enabling them to anticipate the ball's trajectory.

However, it is important to consider that this strategy requires goalkeepers to possess high reaction speed and agility. Without these capabilities, they may not reach the ball in time, even if they predict its trajectory. A study revealed that less skilled goalkeepers tend to hastily dive to one side due to their movement limitations, whereas highly skilled goalkeepers push their reaction limits (Zheng, de Reus & van der Kamp, 2021).

Therefore, goalkeepers should aim to hold their position as long as possible to gather more information that helps determine the shot's direction. However, this action depends on the goalkeeper's reaction and agility. If they lack sufficient agility, they may not reach the ball in time. There is an exception where the opposite advice may be recommended: goalkeepers can dive hastily if they have anticipated, during the player's approach, that the shot will be struck with significant force towards one side of the goal. It has been observed that the frequency of successful goals decreases when a goalkeeper hastily dives against such shots (Noël, van der Kamp & Klatt, 2021).

Furthermore, certain aspects of the shooter's body position can guide goalkeepers in anticipating the ball's trajectory. For example, the orientation of the shooter's hips can indicate the shot's direction. If a player's hips are oriented to the right, it is highly likely that the ball will go to the right side of the goal. Another detail to consider is the orientation of the supporting foot's toe, as the ball tends to follow the same direction as the toe points (Hunter *et al.*, 2018; Islam & Nayan, 2022).

Additionally, the role of behavioral psychology must be mentioned, as the non-verbal language displayed by both the shooter and the goalkeeper can influence the success of a penalty kick. A study revealed how dominant or submissive postures of goalkeepers and shooters can determine the outcome of the shot (Bijlstra, Furley & Nieuwenhuys, 2020). When the shooter assumes a dominant posture and behavior over the goalkeeper, their performance improves. Conversely, when the goalkeeper adopts a dominant posture over the shooter, and the latter displays a submissive attitude, the shooter's performance diminishes.

An example of this was observed during the penalty shootout in the 2021 Copa America semifinal between Argentina and Colombia. The Argentine goalkeeper, Emiliano

Martinez, attempted to establish dominance over all the Colombian shooters ([Copa América, 2021](#)). While the goalkeeper's strategy of distraction against the Colombian players was evident, it was noticeable how the Colombian players exhibited submissive behavior towards the Argentine goalkeeper. In that penalty shootout, Martinez was hailed as the player of the match for saving three penalties.

In light of the above, here are tips that goalkeepers can follow to improve their performance in penalty kicks:

- Engage in visual perception training using penalty kick videos. Access to videos of future opponents can greatly assist in identifying the specific movement patterns of each shooter. Seek support from the team's psychologist and physiotherapist for this purpose.
- Aim to hold the central position in the goal for as long as possible to gather more information that aids in anticipating the ball's direction. However, effective implementation of this advice requires agility and reaction training; otherwise, its effectiveness will diminish.
- If the goalkeeper anticipates that the shooter will strike with excessive power, it is advisable to swiftly dive to one side of the goal, utilizing the information gathered during the player's approach.
- Adopt a dominant posture over the opponent, avoiding submissive body language, as displaying dominance provides a greater chance of saving the shot.
- Train the goalkeeper to observe general body details of shooters, as they provide additional tools for decision-making. Focus on aspects such as the direction of the supporting foot's toe, as players typically shoot in the same direction as the toe points. Also, observe the orientation of the shooter's hips, as the ball usually follows the same direction as their hip orientation.

Explaining the Expert Anticipation Model of Goalkeepers During Penalty Shootouts

Müller & Abernethy ([Müller & Abernethy, 2012](#)) propose a funnel model to explain expert anticipation of shot direction in tennis. The narrowest part of the funnel occurs at the moment of ball-racket contact. This model can be applied to understand expert and non-expert goalkeeper anticipation in penalty shot scenarios. Expert goalkeepers possess the ability to identify relevant aspects and information before, during, and after the opposing player's ball contact. This gives them an advantage in anticipating the direction and power of the shot. As the funnel narrows, the possible shot outcomes

decrease, enabling experts to exploit this narrowing (Smeeton, Meyer & Klatt, 2023). Figure 1 illustrates the expert anticipation funnel model for goalkeepers during penalty shots.

Figure 1
Expert anticipation funnel model for goalkeepers during penalty shots.

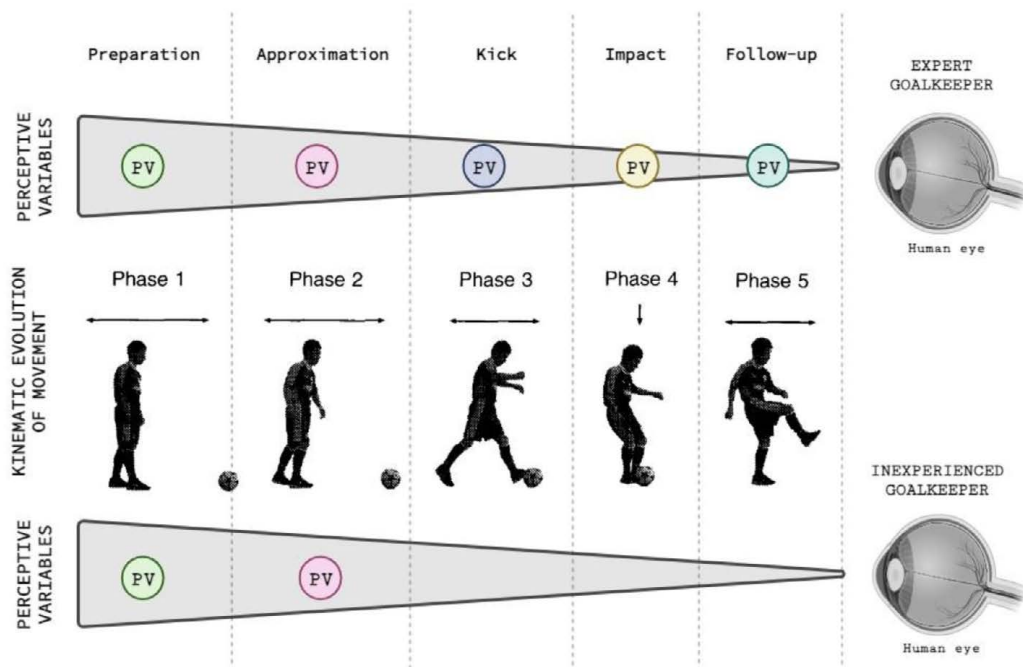


Figure 1. Schematic Model of Expert Goalkeeper Anticipation during Penalty Shootouts. PV refers to all perceptual variables or sources of information that the goalkeeper is capable of detecting during the kinematic evolution of the opponent's movement. It is worth noting that the expert goalkeeper is able to acquire more sources of information than the inexperienced goalkeeper at each phase of the movement. Consequently, the inexperienced goalkeeper will have far fewer tools to respond, resulting in significantly lower anticipation ability. Additionally, since the inexperienced goalkeeper tends to dive prematurely towards one side of the goal, they will not be able to detect the perceptual variables that may arise in phases 3, 4, and 5 of the opponent's movement. Self-created illustration using BioRender.com.

Limitations and Scope

It is crucial to highlight the inherent limitations of this manuscript. Firstly, it is important to recognize that this is not a research *per se* but rather an argumentative essay where the author presents a strong stance against an established paradigm, developing arguments to support their position and line of reasoning. With that said, the first

limitation lies in the fact that analyses of videos of real events occurring in elite football matches are, by nature, isolated cases and not controlled and randomized clinical trials. The points expressed here solely represent the author's perspectives on a paradigmatic situation. Additionally, the target population addressed has been exclusively comprised of professional footballers. This limits external generalization to developmental schools and amateur athletes in developmental and adolescent stages.

Considering the developmental stage could raise numerous questions for future research, such as whether training these skills at early ages could maximize performance in penalty kicks for goalkeepers once they have reached their full physical and neurological development. Or whether it is more difficult to improve the ability to anticipate the direction of a penalty kick in an adult goalkeeper who has never trained these skills.

Another crucial aspect is that, although this essay has strongly argued that the ability to save penalties in football goes beyond chance, it is necessary to remember that there is always a randomness component at play. Despite all efforts by the goalkeeper and their coach to train and enhance these skills, there will always be uncontrollable and unpredictable factors such as weather conditions affecting the direction and trajectory of the ball, or distractions from the audience and other players that can alter the goalkeeper's performance.

It is evident that penalty kicks are not entirely determined by chance, but they are not entirely controllable either. Therefore, within the realm of possibilities, goalkeepers and coaches can attempt to address as many variables as possible to increase the chances of stopping a penalty kick, minimizing the margin of chance. Ultimately, as this text is an essay, further studies are needed to delve deeper into validating the arguments presented here. However, it is important to note that these arguments are highly plausible in the context addressed.

Conclusion

The ability to save penalty kicks transcends mere chance and is grounded in the anticipatory skill of the goalkeeper. A well-trained goalkeeper can accurately discern the trajectory of the ball by integrating multiple sources of information, thus optimizing their chances of success in the task. In this sense, attributing the saving of a penalty kick solely to luck is equivocal. In fact, outstanding goalkeepers rely on audiovisual resources to anticipate and save penalty kicks during real competitions. Furthermore, there are strategies and tips that contribute to improving the performance of goalkeepers in penalty situations. Therefore, luck cannot be considered as the sole determining factor

in this context. It is imperative for goalkeeper coaches to explore the development of anticipatory and predictive skills as an integral part of goalkeepers' preparation, in order to consistently improve their results.

Moreover, it is necessary for researchers to direct their attention towards these athletes, investigating optimal practices and the level of training required to enhance goalkeepers' anticipatory and predictive ability. Ultimately, focusing on the refinement of these skills will not only enrich goalkeepers' performance on the field but also expand understanding of the science behind saving penalty kicks in football.

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Acknowledgments or financing:

The author wishes to abstain from expressing gratitude towards any individual or institution. Additionally, they declare that there were no sources of funding involved in the creation of this text.

Declaration of contribution of authors:

Sebastián Rodríguez contributed to the conceptualization, visualization, writing, reviewing, and editing of the text.