



UNIVERSIDADE TÉCNICA DE LISBOA
FACULDADE DE MOTRICIDADE HUMANA



Decision-making in the Penalty Kick: the Role of Constraints in the Perceptual Guidance of Action

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Abstract

The aim of this thesis was to examine how players' strategies influence available information on movement when performing penalty kicks. An ecological dynamics perspective of the penalty kick is initially presented as a supporting framework for recent research, as well as a plausible path to overcome the shortage of ecological validity of experimental designs that aim to capture the information-based core of players' performance. The effect of different instructional constraints on movement patterns and outcome was analysed and results showed a significant influence on both players' performance speed and on goalkeepers' diving angle, although players' efficacy remained constant. Penalty takers' kinematics was then studied in order to understand its relation with ball's horizontal and vertical directions, as well as the influence of ball direction on penalty kicks' success. Kinematic variables highly correlated to ball horizontal direction were less affected by deceptive actions, demonstrating that genuine movements cannot be biased if an intended goal needs to be accomplished. Ball height influenced outcome, although physical constraints imposed on penalty takers' movement variability (compared with other kick types) decreased the correlations between ball's vertical direction and penalty takers' kinematics. Developed investigation contributed to 1) clarify the influence of different strategies on players' movements, 2) identify genuine sources of information for the anticipation of ball direction, and 3) determine the influence of ball height on penalty kick success.

Keywords: penalty kick, decision-making, perception-action, instructional constraints, strategy, distributed information, local information, kinematics, predictive information, ball direction.

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Resumo:

Esta tese tem como objectivo analisar a influência das estratégias empregues pelos jogadores sobre a informação disponível para a acção na grande penalidade. A dinâmica ecológica é apresentada como base para o enquadramento da pesquisa recente, e como opção plausível para potenciar a validade ecológica dos designs experimentais que pretendam capturar a informação sobre a qual os jogadores agem. Foi analisado o efeito da instrução sobre o comportamento dos jogadores e eficácia na grande penalidade. Os resultados demonstraram uma influência da instrução na velocidade dos jogadores e no ângulo de estiramento lateral do guarda-redes, sem alterações da eficácia. De seguida, a cinemática do rematador foi analisada, procurando entender a sua relação com a direcção da bola. As variáveis cinemáticas correlacionadas com a direcção horizontal da bola foram pouco afectadas pela acção simulatória, demonstrando a impossibilidade de encobrir a acção genuína que cumpre determinado objectivo. A altura da bola influenciou a eficácia, apesar dos constrangimentos físicos impostos sobre a variabilidade de movimento dos rematadores na grande penalidade (comparada com outros tipos de remate) terem forçado uma diminuição das correlações entre a direcção vertical da bola e a cinemática dos rematadores. A investigação desenvolvida contribuiu para 1) clarificar a influência de diferentes estratégias no movimento dos rematadores, 2) identificar fontes genuínas de informação para a antecipação da direcção da bola, e 3) determinar a influência da altura da bola na eficácia da grande penalidade.

Palavras-chave: grande penalidade, tomada de decisão, percepção-acção, constrangimentos instrucionais, estratégia, informação distribuída, informação local, cinemática, informação predictiva, direcção da bola.

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Publications

A position paper and three experimental papers have been published, submitted to publication or currently being prepared for submission. Those papers represent topics 2, 3, 4 and 5 of this thesis.

Published / Submitted/ In preparation

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Congress presentations

Some experimental work and subsequent results of this thesis were presented in national and international scientific congresses with refereeing and published in abstract books of those congresses.

Lopes, J.E., Araújo, D., Jacobs, D. M., Travieso, D., & Araújo, D. (2012). Como pode o guarda-redes prever a direcção da bola na grande penalidade?. In *Livro de Resumos* (pp. 26-27). XIII Jornadas da Sociedade Portuguesa de Psicologia do Desporto, 26-27 Outubro, Lisboa, Portugal.

Lopes, J. E., Travieso, D., Jacobs, D., & Araújo, D. (2012). Movement registration and kinematic variables in deceptive and non-deceptive penalty kicks. In *Book of Abstracts* (pp.71), 12th European Workshop on Ecological Psychology, 27-30 June, Madrid, Spain.

Lopes, J.E., Araújo, D., Duarte, R., Davids, K., & Fernandes, O. (2011). Performance na grande penalidade: efeitos da instrução na tomada de decisão e o contributo da cinemática. In *Livro de Resumos* (pp. 58-59). XII Jornadas da Sociedade Portuguesa de Psicologia do Desporto, 4-5 Novembro, Portimão, Portugal.

Lopes, J.E., Araújo, D., Fernandes, O., & Davids, K. (2010). Interpersonal dynamics shape decision making in goalkeepers and penalty kickers in performance. In *Book of Abstracts* (pp. 119). European Workshop of Ecological Psychology, 9-12 June, Fréjus, France.

Lopes, J.E., Araújo, D., Fernandes, O., Davids, K., Barreiros, J., & Peres, R. (2010). The entangled decisions of penalty takers and goalkeepers in

association football. In D. Araújo, N. Balagué, R.J. Bootsma, J. Mateus, & V. Correia (Eds.), 2nd International Congress of Complex Systems in Sport and 10th European Workshop on Ecological Psychology, Funchal, Madeira, Portugal. *International Journal of Sport Psychology* (Special Issue), pp. 89-90.

Lopes, J.E., Araújo, D., & Jacobs, D. M. (2010). The complex dynamics of decision making in the penalty kick task in football. In *Book of Abstracts* (pp. 150-151). The 3rd International Congress of Complex Systems in Medicine and Sport, 15-18 September, Kaunas, Lithuania.

Other publications

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Visiting Research

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