

## AN ANALYSIS OF GOALKEEPER DIVING RESPONSE TIME FOR THE PENALTY KICK IN SOCCER

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The purpose of this study was to discuss the response time of different diving techniques for goalkeepers. A total of 6 subjects from college soccer teams were analyzed in this study. A self-designed flash unit was used as a starter signal, and a high-speed camera and a synchronized force plate were used to record the data. The data was digitized by Peak Motus 4.2. The results showed that in a type A take-off dive, the response time was faster for dives to the bottom left and bottom right corners. In a type B take-off dive, the response time was faster for dives to the bottom left, bottom right and upper left corners. Knowledge of the different response times for the different diving directions could be of benefit in training for coaches and players.

**KEY WORDS:** soccer, penalty kick, response time

**INTRODUCTION:** Jumping is a basic ability in human movement. Coutts divided jumping into two types: First is the Hop jump, where both legs leave the ground simultaneously at take-off. The other is the Step-Close jump, where one leg leaves the ground first followed by the other leg. The goalkeeper when diving often uses similar take-off jumping techniques. Different take-off jumping techniques could result in different response times, and this is important for the goalkeeper. The purpose of this study was to find some faster take-off techniques for coaches and athletes to work on in training.

**METHODS:** Magill (1989) indicates that response time was the duration from signal stimulation to starting movement. In this study, the response time was defined as the duration from the light signal start to the touching of the target in the goal. Generally the take-off techniques used could be divided into two types: Type A and Type B. Type A is a hop jump take-off and Type B is a step close jump take-off. A total of six elite male soccer players were recruited as subjects. Their mean age, height and weight were 28.42 yrs, 181 cm, 76.67 kg respectively. A high-speed camera (120 Hz) and a synchronized Kistler force plate were used to record the data. The film was digitized by Kwon 3D motion analysis system and the raw data were smoothed by Butterworth 4<sup>th</sup> order zero lag with 6 Hz cutoff frequency. Two Way ANOVA was used to statistically compare the results of the two take-off types for different diving directions. The  $\alpha$  value was set as 0.05.

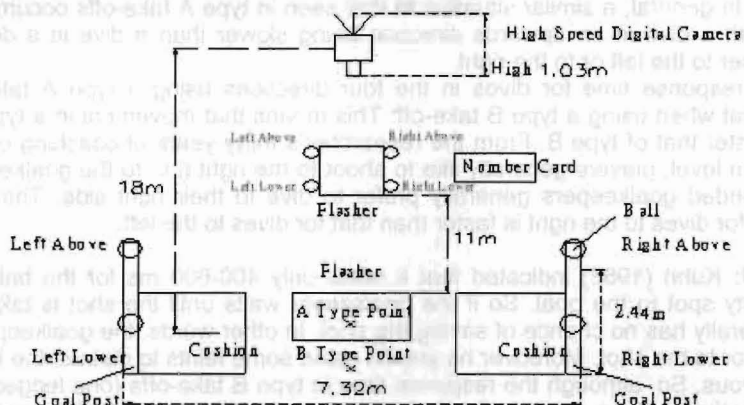


Figure 1 Diagram of the instrument setup.

**RESULTS:****Table 1 The response time (RT) for four directions in the type A take-off, Unit: sec.**

Direction	Upper left corner	Bottom left corner	Upper right corner	Bottom right corner
N	6	6	6	6
Mean	1.437	1.364	1.378	1.284
SD	0.103	0.073	0.052	0.021

Table 1 shows the response time for the four diving directions in a type A take-off. The result showed that response time for a dive to the bottom left (1.364sec) and bottom right corners (1.283 sec) is significantly faster than a dive to the top-left corner (1.437). The response time for a dive to the bottom right corner (1.284) is significantly faster than ones to the upper-right (1.378) and bottom-left corners (1.364). Moreover, the response time for dives to the bottom-right corners is the fastest of the four directions and is significantly faster than the other directions. Generally speaking, the response time for the goalkeeper to move downward is faster than upward. This could be explained by the fact that the player may be used to diving in this direction. In addition, this result always occurred in a right-handed player, who usually moved more slowly in a leftward lateral direction.

Outfield soccer players should use these limitations of goalkeepers. Since the response time for dives in a left upward direction is slower than in the other three directions (Table 1), players may have increased success when choosing this direction to shoot.

**Table 2 The response time (RT) for four directions in the type B jump, Unit: sec.**

Direction	Upper left corner	Bottom left corner	Upper right corner	Bottom right corner
N	6	6	6	6
Mean	1.925	1.652	1.990	1.662
SD	0.064	0.139	0.021	0.096

Table 1 shows the response time for the four diving directions in a type B take-off. The results indicated that the response time for dives to the bottom-left (1.652 sec), bottom-right (1.662 sec) and upper-left corners (1.925 sec) were significantly faster than for dives to the upper-right corners (1.990 sec); that a dive to the bottom-right corner (1.662 sec) is significantly faster than one to the upper-left corner (1.925 sec); that a dive to the bottom-left corner (1.652 sec) is significantly faster than one to the upper-right corner (1.925 sec). In other words, the response time for a dive to the upper-right corner is the slowest of the four diving directions in a type B take-off. This also means that the diving motion in that direction is the slowest. In general, a similar situation to that seen in type A take-offs occurred in type B take-offs, with a dive in an upwards direction being slower than a dive in a downwards direction whether to the left or to the right.

Generally the response time for dives in the four directions using a type A take-off was quicker than that when using a type B take-off. This means that movement in a type A take-off could be faster than that of type B. From the researcher's thirty years of coaching experience at national team level, players generally like to shoot to the right (i.e. to the goalkeeper's left side). Right-handed goalkeepers generally prefer to dive to their right side. Therefore the response time for dives to the right is faster than that for dives to the left.

**CONCLUSION:** Kuhn (1988) indicated that it takes only 400-600 ms for the ball to move from the penalty spot to the goal. So if the goalkeeper waits until the shot is taken before diving, he generally has no chance of saving the shot. In other words, the goalkeeper should start to dive prior to the shot. Moreover he should make some feints to distract the kicker and make him nervous. So, although the response time in type B take-offs (one legged take-off) is a little longer than in type A take-offs, the coach and player should still take notice of the skills involved in a type B take-off.

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