

Creating a reaction time tester to react with the reaction reflex of football goalkeepers with the evaluation of estimated extrapolation skills for the best goalkeepers in the U-League

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Abstract

The design of the semi-experimental method to create the reaction time football goalkeeper inventory (RTTGI) tester was integrated. The quality of RTTGI was evaluated by 7 professional experts: the electronics and wireless engineers and football goalkeeper trainers with the content validity, the Index of Item Objective Congruence (IOC) value, the reliability, and the objectivity value. The sample size consisted of 20 football goalkeepers from Thailand Football U-League. The RTTGI includes three parts and recording reaction time with a digital test display in two weeks. 2 testers of their performances tested the GKs' action speeds. Means, standard deviation, simple correlation, and IOC were analyzed. The efficiency and effectiveness of the RTTGI in the content validity analysis comprises 89% with the IOC, and the reliability is 0.88. The performances of the 7 professional experts including the utilization, possibility, suitability, and accuracy scales at the Very Suitable level on all four scales. A person can have a great reaction time when responding to a stimulus. Goalkeepers need the ability to change the shape and form of their bodies to make successful saves. They separated the ability to pull off a reaction save frequently from a good goalkeeper. Full-body kinematics were measured in ten elite goalkeepers diving to hold high and low balls at both sides of the goal to investigate their starting position, linear and angular momentum, and legs' contribution to end-performance. Coaches must highlight horizontal lateral skills and exercises with an emphasis on pushing with the contra lateral leg when training and evaluating goalkeeper physical performance.

Keywords: Creation, a reaction time tester, reacting reflex, football goalkeepers, estimated extrapolation, U-League, and average reaction time

Introduction

Many physiological and nutritional demands occur within the body during exercise. As muscles contract, the demand for oxygen, hydrogen, and other key nutrients increases. The human body requires a continuous supply of energy to perform its many functions. As energy demands increase with exercise, additional energy must be supplied or the exercise will end (Harguth, 2017). A person who is physically fit is capable of performing and enjoying daily activities. The importance of being physically fit cannot be understated. More people are at risk for cardiovascular disease, depression, obesity, hypertension, and other health problems due to issues because of their fitness level (Stetson, 2017)

There are seven characteristics of perfectly healthy people: strong nails; healthy teeth and gums, balanced gums, body mass index is balanced; enough sleep; social interaction; and healthy diet (TEMPO.CO., 2017) Physical performance ability tests have also been used in personnel selection, especially in certain jobs such as firefighting and police work. One classification conceptualizes physical ability as being composed of nine dimensions: static strength, explosive strength, dynamic strength, trunk strength, extent flexibility, dynamic flexibility, gross body coordination, gross body equilibrium, and stamina (Ones & Viswesvaran, 2009)

Taking part in physical activities such as sports improves your heart function, reduces the risk of diabetes, controls blood sugar, and reduces tension and stress levels. It also brings positive energy, discipline, and other commendable qualities to your life (Manhattan Medical Arts, 2019) Repeated physical activity causes an increase in your body's performance capacity. This physiological response is called the Training Effect (TE). Measurement and making sense of the effect of training is the key to effective training and achieving optimal results (QAthlete, 2019) Application of professional heart beat analysis to support various aspects of well-being. The solution is developed for the needs of work-related research, occupational and preventive healthcare, and applied physiological research (QAthlete, 2019) Benefits of sport players reduced the risk of obesity; increased cardiovascular fitness, healthy growth of bones, muscles, ligaments, and tendons, improved coordination and balance. A greater ability to physically relax and, therefore, avoid the complications of chronic muscular tension such as headache or backache was tested (Better Health Channel, 2017) Soccer (also called football, especially

in other countries) is the most popular sport in the world and is played in most countries. It is a team sport, involving 11 players on each side who use their legs, head, and torso to pass a ball and score goals. The nature of the game means that players may be sprinting, running fast or slow, and sometimes may be standing around. Soccer can be a great workout and lots of fun. The health benefits include that it increases aerobic capacity and cardiovascular health, lowers body fat and improves muscle tone, builds strength, flexibility and endurance, increases muscle and bone strength, and improves health due to shifts between walking, running, and sprinting. (Better Health Channel, 2017).

The goalkeeper, sometimes shortened to keeper or goalie, is one of the major positions of association football. It is the most specialized position in the sport. The goalkeeper's primary role is to prevent the opposing team from scoring (moving the ball over the defended goal line within the frame of the goal) (Rebello-Goncalves, 2016). This is accomplished by the goalkeeper moving into the path of the ball and either catching it or directing it away from the vicinity of the goal line. Within the penalty area, goalkeepers can use their hands, making them (outside throw-ins) the only players on the field allowed to handle the ball (Garriot, 2014). The special status of goalkeepers is indicated by them wearing kits of different colors from their teammates. Because the position requires different skills from the outfielders, goalkeepers train separately from their teammates and instead work with a goalkeeper coach because they have different skills. A goalkeeper must be able to move quickly and have fast feet for little bursts (UEFA Euro, 2012).

Based on the researcher's experience as a football coach at Kasetsart University in Thailand and having been in football throughout the present day. In football competition matches, the losing team has the goalkeeper having less reaction time than the winning team. In addition to the physical fitness enhancement equipment associated with soccer skills, there is no reaction time tester for football goalkeepers. The invention of reflexes tests does not classify sports and is not specifically intended to be tested for football goalkeepers. Time testing equipment is expensive and is powered by electricity. Therefore, there are limitations to testing. The reaction time should have low tolerances, and the timekeeping resolution is in milliseconds or 0.001 seconds (Sungpook et al., 2021).

Reaction time is an important indicator of neuromuscular status in older adults. A simple, portable, and inexpensive method of measuring reaction time is needed for use in geriatric clinical settings (Radford University, 2020). In addition to measuring your reaction time, this test is affected by the latency of your computer and monitor. Using a fast computer and a low latency/high frame rate monitor will improve your score. Scores in this test are faster than those in the aim trainer test, because you can react instantly without moving the cursor. This is discussed in further detail on the statistics page. Although an average human reaction time may fall between 200-250ms, your computer could be adding 10-50ms on top. Some modern TVs add up to 150ms! If you want, you can keep track of your scores and see your full history of reaction times. Just perform at least 5 clicks and then save (Human Benchmark, 2018).

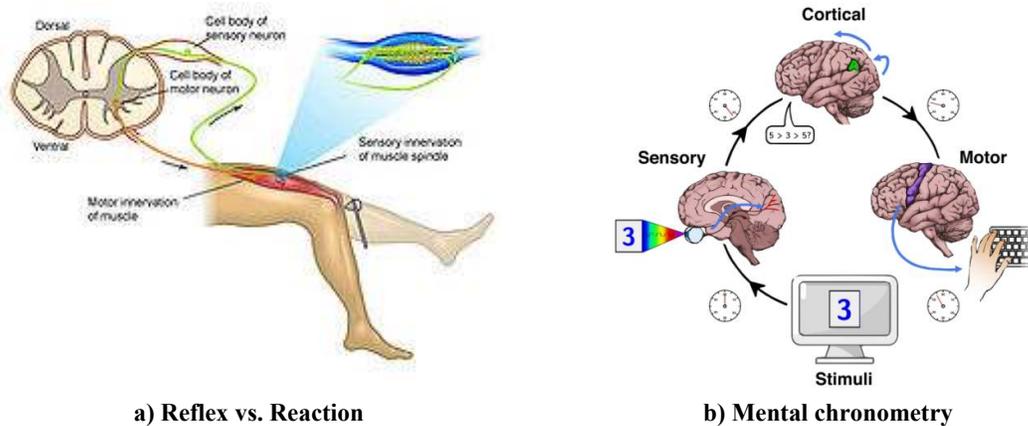
The reasons as above make sense for the researchers to have made sense of the importance of the reaction time invention for testing the football goalkeepers. We have interest in creating a reaction time testing invention for football goalkeepers that was up-to-date and a testing invention that needs of users. It will be useful for trainers and people with general interests. Goalkeepers can test their responses' physical reflexes themselves with this reaction time was invented.

Historical background of the reaction time, interest in the measurement of human reaction time (the time elapsing between the onset of a stimulus and the onset of a response to that stimulus) apparently began as a result of the work of a Dutch physiologist named F. C. Donders. Beginning in 1865, in his early experiments, Donders applied electric shocks to the right and left feet of his subjects. Donders found that the difference between the two conditions was 1/15 seconds. In 1840, the Englishman Charles Wheatstone invented a device for measuring the velocity of artillery shells. By 1842, a Swiss watchmaker named Mathias Hipp had improved on Wheatstone's design and began selling an instrument. Later models of his 'Hipp Chronoscope' had vibrating regulators which vibrated at 1000 Hz. Although a significant portion of each day was spent laboriously calibrating Hipp chronoscopes, Wundt gradually collected measurements of a wide variety of mental phenomena (Perera & Haupt, 2001).

Reaction time is a measure of the speed with which an organism responds to some kind of stimulus. You also have "reflexes" too. Reflexes and reactions, while seemingly similar, are quite different. Reflexes are involuntary, are used to protect the body, and are faster than a reaction. Reflexes are usually a negative feedback loop and act to help return the body to its normal functioning stability, or homeostasis. The classic example of a reflex is one you have seen in your doctor's office: the patellar reflex (Backyard Brains, 2016). The brain then needs to send many signals to various muscles. Feet begin to move, hands might travel in front of the face, and eyes may close, along with many more processes. This is the work of many neurons as well as numerous systems and circuits in the brain, and what is more, you can train and enhance your skill through practice. This is how you get better at sports over time (Creeden, 2009).

Simple reaction time (SRT), the minimal time needed to respond to a stimulus, is a basic measure of processing speed. SRTs were first measured by Francis Galton in the 19th century, who reported visual SRT latencies below 190 ms in young subjects. However, recent large-scale studies have reported substantially increased SRT latencies that differ markedly in different laboratories, in part due to timing delays introduced by

the computer hardware and software used for SRT measurement. Precise computer-based measurements of SRT latencies show that processing speed is as fast in contemporary populations as in the Victorian era, and that age-related increases in SRT latencies are due primarily to slowed motor output (Woods et al., 2015). Previous studies were mainly on simple reaction time, and there are very few studies on visual choice reaction time compared to yellow. This could be because the mental processing time of individual colors for the yellow color is more than red and green (Balakrishnan et al., 2014) (detailed in Figure 1).



a) Reflex vs. Reaction
 b) Mental chronometry
Figure 1: Reflex and reaction time with response time with the mental chronometry
 Sources: a) Johnson (2015), b) Kranzler (2012)

Mental chronometry is the scientific study of processing speed or reaction time in cognitive tasks to infer the content, duration, and temporal sequencing of mental operations. Reaction time (RT; sometimes referred to as "response time") is measured by the time elapsed between stimulus onset and an individual's response to elementary cognitive tasks (ETC), which are relatively simple perceptual motor tasks typically administered in a laboratory setting (Kranzler, 2012) (see in Figure 2).



a) Goalkeeper training: quick reflex and reaction drills
 b) Goalkeeper speed & Reaction training

Figure 2: Reaction time' responses by goalkeepers' training
 Source: a) Adblock for Youtube (2015), b) Adblock for Youtube (2012)

Goalkeepers need agility to change the shape or form of their body to make successful saves. Reaction time all comes down to the keeper's reflexes. If the keeper sees the ball early enough and accurately judges the speed and flight of the ball, they will have time to react and make the save. Great goalkeepers also need glut and hamstring mobility. Mobility in this part of the body allows the keeper to generate as much power as possible. Dynamic stretching exercises, such as walking toe touches, will increase the mobility of the glut and hamstrings of a keeper (Ambush, 2018). But reaction time is especially important in football because plays develop quickly, last only a short time, and feature massive athletes racing all about the field. Regardless of your position on the team, the faster you are able to react to any set of circumstances, the better your chances of making the play (Herman, 2011).

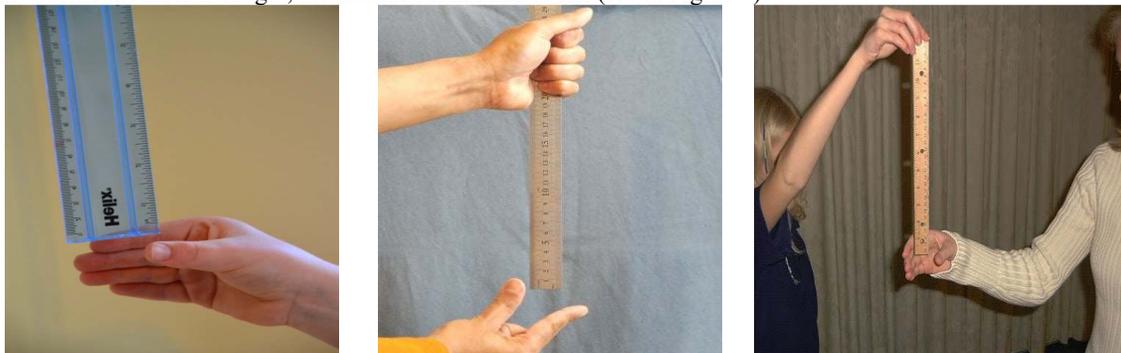
Goalkeeper can reflex training on five reaction drills for goalies: turn and stop drill, this drill will help develop recognition and reaction time; turn and cover drill, a variation on the previous drill, this also begins with the goalkeeper facing the goal; double strike drill; drop catches drill; pick one drill; and follow the bounce ball drill (The Graphic Edge, 2017). The ability to frequently pull off an unbelievable, seemingly impossible, reaction save is what separates a good goalkeeper from a great goalkeeper. It is those sharp reflex saves that allow keepers to dent the league table over the course of a season (TOBY, 2019) see in Figure 3).



Figure 3: Goalkeeper can reflex training on five reaction drills for goalies
Source: The Graphic Edge (2017) 27].

Test your reaction time: There is an easy way to test reaction times using just a ruler. Reaction time is the time it takes for a person to respond to a stimulus (Vanstone, 2014).

1. Hold the top of the ruler with your arm stretched out. Your fingers should be in the highest measurement.
2. Ask a friend to put their thumb and index finger slightly open at the bottom of the ruler, with the ruler between their fingers.
3. Drop the ruler and record the measurement on the ruler where the other person's fingers are.
4. Repeat for all participants. Let each person have three attempts and record the average value.
5. The person with the fastest reaction time is the one who catches the ruler at the lowest measurement, as the sooner the ruler is caught, the less time it has had to fall (see in Figure 4).



a) Test reaction times using just a ruler **b) Reaction time: The ruler drop test** **c) Reaction time by ruler test**

Figure 4: An easy way to test reaction times using just a ruler
Source: Vanstone (2014).

Evaluation of a specific reaction and action speed test for the football goalkeeper that involved perceptual and movement response components (i.e., sprint running, jumping, diving, and direction changing), and performance (i.e., first goalkeepers and substitutes) groups of goalkeepers, including measures of test-retest reliability. The test-retest correlations of the reaction and action speed (RAS) test performance were significant in all single measurements with the intra-class correlation coefficient and complex measurements. The RAS test provided a reliable and valid method to assess specific defensive agility in a group of youth soccer goalkeepers. Performance responses during the RAS test allow coaches to discriminate between age-matched goalkeepers, identify weaknesses Knoop, Fernandez-Fernandez & Ferrauti (2013) That was detailed in Figure 5.

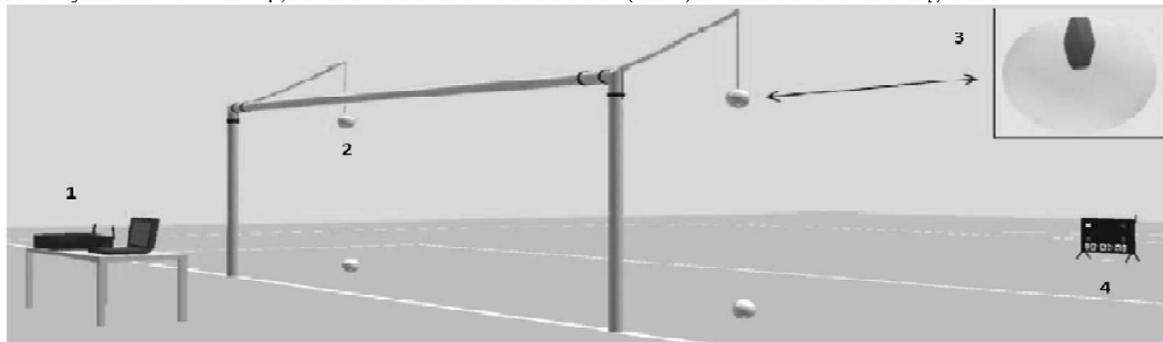


Figure 5: Schematic representation of the reaction and action velocity device. 1) Computer and receptor; 2) Soccer balls (footballs); 3) slot position for the touch-sensitive tri-axial transponder; and 4) signal panel.
Source: Knoop, Fernandez-Fernandez, & Ferrauti (2013).

The use of a new electronic measurement platform to assess the performance of goalkeepers based on their cognitive and motor skills. A test was run to show how the GoMeSy platform could be used by coaches to evaluate the penalty shot stopping skills of goalkeepers, consequently, the performance of 22 players was measured. In the case of cognitive skills, there is no significant difference between novice and expert goalkeepers ($p = 0.333$); while, in the case of motor skills, there is a significant difference ($p = 0.006$). Furthermore, there is a moderate and positive correlation between weight and movement time ($r = 0.437$). The body mass index depends on the height and weight of each subject, coaches should focus primarily on monitoring the weight of players to improve their performance (Rodríguez-Arce, Flores-Nez, & Hernández-López, 2019) that was detailed in Figure 6.

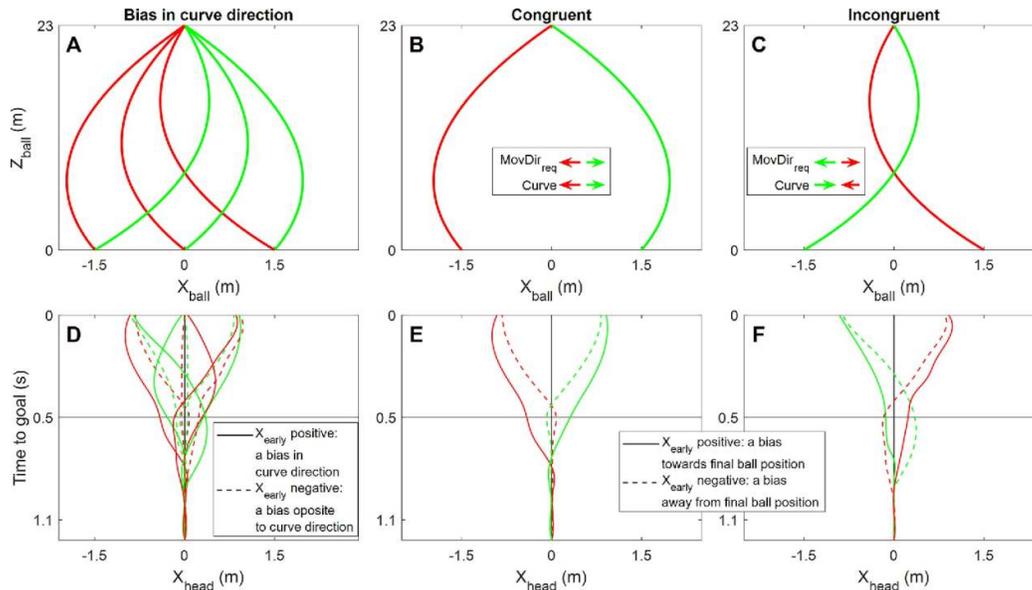


Figure 6: Assessing the performance of soccer goalkeepers based on their cognitive and motor skills
Source: Rodríguez-Arce, Flores-Nez & Hernández-López, 2019).

The U League or the Thailand University League is a football competition between football teams from higher education institutions in Thailand. It was first organized in 1997 and has been held every year by U-League International Company Limited and Miss U League Contest.

The number of teams that participate in U-League football each year varies depending on the invitation from the U-League Company, and the whole team will be from Bangkok due to the limited travel budget. They gave management rights to RK Media Holding company Limited followed by Canon and AIA in the following years before the U-League ended and returned to organize U-League football again in 2014 until today (Manager Online, 2020).

Methods

Research on a semi-experimental research method for creating the reaction time testing invention was tested the reflex of the football goalkeepers to estimate the extrapolation in the average reaction time were important. Objective to create a reaction time testing inventory, the high quality and efficiency of the reaction time tester reflex of the football goalkeepers to estimate extrapolation in the average reaction time

The steps of research procedures including

Step I: Consulted an expert on building a reaction time test invention for goalkeepers from an electronics and wireless engineer.

Step II: Designed the invention by drawing a blueprint of the invention to be created and consulting the goalkeeper trainer experts, and engineering specialist to investigate the possibility of creating an invention.

Step III: Invented a reaction time tester for football goalkeepers, which includes a hand-tactile indicator light, a foot-touch indicator light, and a digital test display that was detailed in Figure 7.

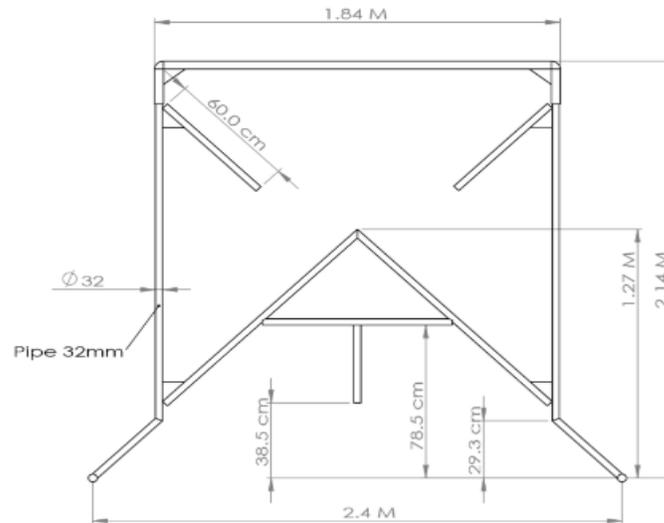
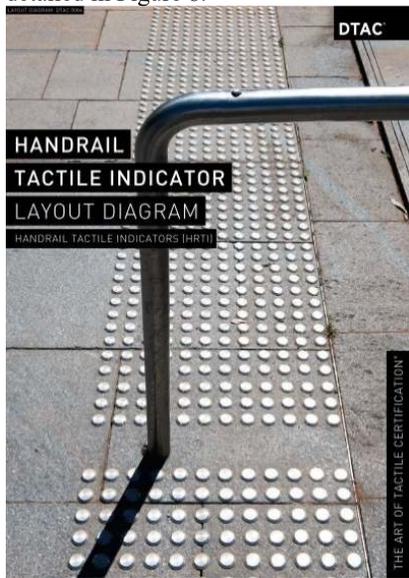


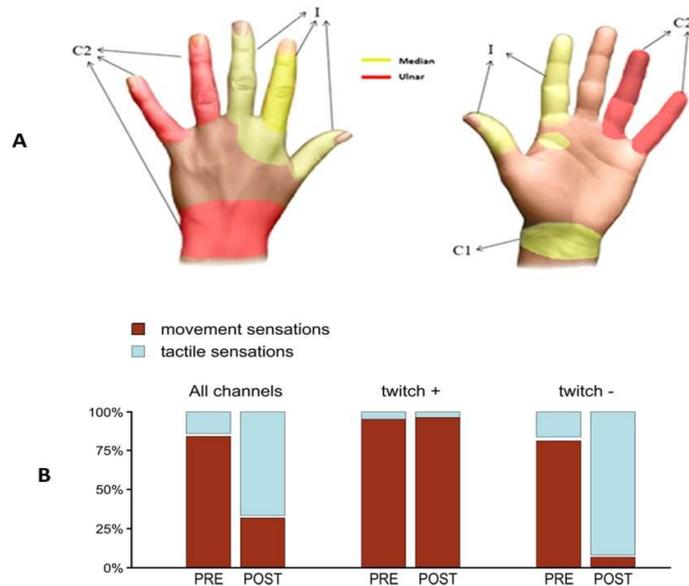
Figure 7: Drawing a blueprint of the invention to be created and consulting the goalkeeper
Source: Harnmak, Singhchainara & Sungpook (2021)

A hand-tactile indicator light

The restoration of tactile sensation to the fingers and the hand, there are no examples of use of the routed sensory information to finely control a prosthetic hand in complex grasp and manipulation tasks. Here, it is shown that force and slippage sensations can be elicited in an amputee by means of biologically inspired slippage detection and encoding algorithms, supported by a stick-slip model of the performed grasp that was detailed in Figure 8.



a) A hand-tactile indicator light



b) Restoring tactile sensations via neural interfaces for real-time force-and-slippage closed-loop control of bionic hands

Figure 8: A hand-tactile indicator light
Source: Modified from Zollo *et al.* (2019)

A foot-touch indicator light

Modified reaction times (RTs) for a switch release are faster for hand-controlled switches than for foot-controlled switches for physiological and anatomical reasons (e.g., nerve conduction speed). The risk of accidental trauma could be reduced if the surgeon reacted faster and, therefore, improve the surgical outcome; the RT for hands is faster than for feet. The data suggest that a hand-controlled ophthalmic instrument might have distinct advantages; however, clinical correlation is required (Pfister *et al.*, 2014) that was detailed in Figure 9.

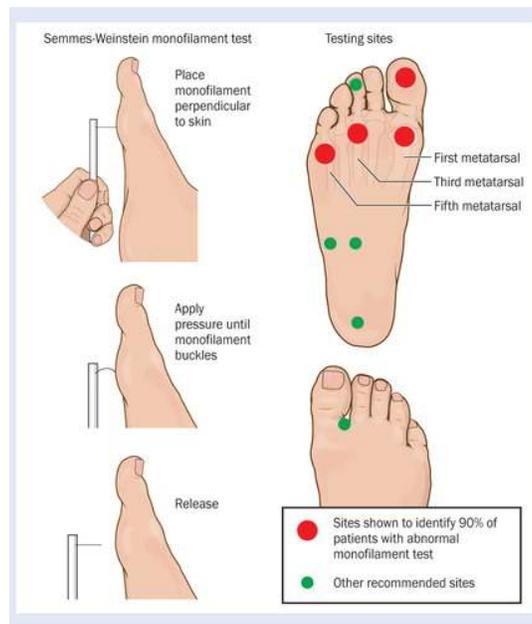


Figure 9: A foot-touch indicator light
Source: Ousey et al. (2018)

A digital test display

Drafting and designing the invention for the digital test display according to the principles and theories according to scientific and engineering processes (That was detailed in Figure 10).



a) The Master Control Box and the LCD Screen



b) The Controller and Stopwatch

Figure 10: A digital test display
Source: Harnmak, Singhchainara, & Sungpook (2021)

Step IV: Analyze the quality of the invention in terms of the validity of theof content and suitability of the invention (Appropriateness) by assessing suitability in all 4 aspects such as: utilization, the possibility of suitability, the accuracy of the invention by 7 expert professionals that consisted of engineers specializing in electronics and wireless systems, academics specializing in physical education, and the trainers who were specifically responsible for training goalkeepers. It was found that the instrument had an IOC value of 89% appropriate at the highest level.

Step V: The goalkeeper's reaction time test invention created by the researcher (Try-out) was brought to the football goalkeepers in the experimental group to find out the flaws of the invention and to improve it for the research.

Step VI: Reliability invention quality analysis by testing (test-retest) by bringing one set of inventions to test 2 times, the first and the latter 1 week apart. The quality of the inventions was found to be at a good level.

Step VII: Objectivity analysisanalysis by using two testers to conduct the test and as a scorer. The quality of the invention has been found to be very good.

Step VIII: Preparing user manual for a guide to using the reaction time testing invention for soccer goalkeepers.

Step IX: data analysis;

1. The validity of the content was analyzed using IOC values (Index of Objective Congruence of Items) and the suitability of the invention was assessed by means and variance.
2. Reliability Analysis with Internal Consistency Cronbach (alpha reliability) coefficient
3. Objectivity was analyzed using the Pearson product moment correlation coefficient statistic.

Step X: The sample consisted of 20 football goalkeepers who participated in the Thailand University Football Champions Cup League for Higher Education League.

Step XI: Research instruments include a reaction time testing goalkeeper invention (RTTGI) to assess football goalkeepers, and the suitability assessment form (SAF).

Results

Research was created on a semi-experimental method to investigate the reaction time testing invention for football goalkeepers that can be used to measure the reaction time of football goalkeepers for estimating extrapolation in the average reaction time. The results are summarized as follows:

The Reaction-Time Testing Invention

The reaction time testing invention for soccer goalkeepers created by the researcher includes:

1. The hand-touched light button means a hand-touched light button to turn off the light during the test on the goalkeeper reaction time tester.
2. The Foot-Touch Light Button means the foot-touch indicator light to turn off the light during testing on the Goalkeeper's reaction time tester.
3. The Digital Test Display refers to the reaction time test instrument display for soccer goalkeepers.

Content Validity Analysis

The content validity analysis of the reaction time tester for football goalkeepers with the IOC reported in Table 1

Table 1: Content Validity Analysis with the IOC for the RTTGI Tester

Trial	Scoring orders of professional experts (-1, 0, and +1)							IOC level	Interpretation
	1	2	3	4	5	6	7		
The RTTGI can ensure that the test results are accurate.	1	1	1	1	1	1	1	1.00	Accept
The RTTGI is capable of testing exactly the purpose of the measurement.	0	1	0	1	1	1	0	0.57	Non accept
The RTTGI can be used to test. Practice and quality.	1	0	1	1	1	0	1	0.71	Accept
The RTTGI can be used to test. Practice and efficiency.	1	0	1	1	1	1	1	0.86	Accept
The RTTGI can be used to test. Practice and effectiveness.	1	1	1	1	1	0	1	0.86	Accept
The RTTGI can be put to practical use to apply.	1	1	1	1	0	1	1	0.86	Accept
The RTTGI has a highly accurate measurement resolution.	1	1	0	1	1	1	1	0.86	Accept
To develop and evaluate a new test for the football goalkeeper that involved perceptual and movement response components with the RTTGI	1	1	1	1	1	0	1	0.86	Accept
The evaluation consisted of measurements at different age with the RTTGI Tester	1	0	1	1	1	1	0	0.86	Accept
Total	8	6	7	9	8	6	7	88.95%	Accept

$N=7$, RTTGI= *The Reaction Time Testing Goalkeeper Invention*

The content validity analysis of the reaction time tester that was accepted at the level of 89% with the IOC as reported in Table 1. This result is higher than the value the standardized omit criteria at 85%

Pearson correlation coefficients

The first week and the second week of the reaction and action speed, sprint and counter movement jumps of the goalkeepers with mean, standard deviation, variance for the RTTGI reported in Table 2.

Table 2: Average reaction time with means, SD using Pearson's correlation coefficients (r) for the RTTGI Tester

Trial	The first week		The second week		r
	Means	S.D.	Means	S.D.	
Reaction time	0.876	0.05	0.875	0.25	0.88

$N=20$

Table 2 reported the reliability of the RTTGI Tester as 0.88.

The Objectivity Analysis for the RTTGI Tester

The results of the objective analysis of the reaction time testing invention for football goalkeepers using two testers as the time recording operator are reported in Table 3.

Table 3: The objective analysis for the RTTGI recoding data (second) by the two testers

Trial	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Tester 1(sd)	0.95	0.97	0.88	1.03	0.92	0.87	0.92	0.92	0.87	0.92	1.11	1.02	1.03	1.03	0.97	0.87	0.99	0.65	0.85	0.92
Tester 2(sd)	0.95	0.97	0.88	1.03	0.92	0.87	0.92	0.92	0.87	0.92	1.11	1.02	1.03	1.03	0.97	0.87	0.99	0.65	0.85	0.92

N=20

In Table 3, the time scorings were recorded by two testers to assess the 20-football goalkeepers, similarly.

Appropriateness suitability analysis (ASA)

The appropriateness suitability analysis (ASA) of the reaction time test invention for football goalkeepers from a total of 7 professionals in 4 areas: utilization, possibility, suitability, and accuracy scales that reports in Tables 4, 5, 6, and 7.

Definition of suitability level and scoring values on five options (Demir & Baylan, 2019) as follows:

- Means ranged 1.00-1.80 refer to Not Very Unsuitable
- Means ranged from 1.81-2.60 refers to Unsuitable
- Means ranged from 2.61-3.40 refers to Suitable
- Means ranged from 3.41-4.20 refers to Highly Suitable
- Means ranged 4.21-5.00 refers to Very Suitable

Table 4: Means and standard deviation of the ASA on Possibility, and accuracy scales for the RTTGI Tester

Trial	Means	S.D.	Suitability level
Utilization scale			
The RTTGI provides information to meet the needs of users.	4.57	0.73	Very Suitable
The RTTGI uses for improving the reaction time of football goalkeepers.	4.71	0.45	Very Suitable
<i>Total</i>	<i>4.62</i>	<i>0.59</i>	<i>Very Suitable</i>
Possibility scale			
There is a practical possibility to improve the reaction time of football goalkeepers for the RTTGI Tester	4.71	0.45	Very Suitable
The RTTGI is acceptable and possible to be exploited in football sports	4.14	0.64	Very Suitable
The RTTGI is possible to put it into practice really	4.43	0.49	Very Suitable
<i>Total</i>	<i>4.42</i>	<i>0.52</i>	<i>Very Suitable</i>
Suitability scale			
The RTTGI can ensure that the results of the test are accurate and appropriate.	4.29	0.45	Very Suitable
The RTTGI responses of the basic abilities for a football goalkeeper.	4.71	0.45	Very Suitable
The RTTGI is appropriate to develop the reaction time of football goalkeepers.	4.71	0.45	Very Suitable
<i>Total</i>	<i>4.57</i>	<i>0.47</i>	<i>Very Suitable</i>
Accuracy scale			
The RTTGI assures the results of measurements and they are accurate.	4.29	0.45	Very Suitable
The RTTGI is accurate and accurate according to the evaluation principles.	4.57	0.49	Very Suitable
<i>Total</i>	<i>4.43</i>	<i>0.47</i>	<i>Very Suitable</i>

N=7

As reported in Table 4, the response of the 7 professional experts of their ASA on the utilization, possibility, suitability, and Accuracy scales for the RTTGI tester indicated that of their perception results at a very suitable level on all items and totalized the results on the four scales.

Discussion

Research on measuring development and evaluating a new test for the football goalkeepers that involved perceptual and movement response components with the reaction time testing football goalkeepers invention (RTTGI) was tested by the two testers including the sprint running, jumping, diving and direction changing of 20 football goalkeepers of the competition of the Thai University Football Leagues (U-League) in 2019 in Thailand.

The content validity analysis of the reaction time tester for football goalkeepers with the IOC was valid and reliable with Pearson's correlation efficient analysis by the 7 professional experts included the Electronic and Wireless Specialist Engineer, the soccer goalkeeper trainers were assessed with the Content Validity and Appropriateness Analysis in four scale namely; Utilization, Possibility, Suitability and Accuracy scales that, overall, on four scales indicated very suitable levels.

Free kicks are an important goal scoring opportunity in football. It is an unwritten rule that the goalkeeper places a wall of defending players in order to make scoring harder for the attacking team. However, the defensive wall can occlude the movements of the kicker, as well as the initial part of the ball trajectory.

Research on one-handed catching suggests that a ball coming into view later will likely delay movement initiation and possibly affect performance of naïve participants and skilled goalkeepers. The movements were thus initiated sooner after the ball came into view, based on less accumulated information. For both naïve participants and skilled goalkeepers, this delayed initiation significantly affected performance Valkanidis et al., (2020).

However, many changes in navigation tools and surgical devices have been introduced in recent decades. In the early 1990s, the semi-automatic transmission vehicle was introduced in the Formula 1 car racing game. In a sport where high performance is crucial in every aspect, the hand-controlled pedal shift had completely displaced the conventional gearbox with the foot-controlled clutch within just 5 years. Changes can also be seen in aviation. With advancing technology, the fly-by-wire system, a computer-assisted navigation unit, became more and more common in commercial and military airplanes. The central control unit for the pilot is a multifunctional hand-controlled side sticks (Pfister et al., 2014).

In terms of reaction time testers, an attempt has been made to study the variation of three forms of visual & auditory reaction times, namely i) simple reaction time, ii) discriminative reaction time, and iii) choice reaction time of football players with respect to their field playing positions (Gandhi et al., 2016). Visual reaction time varies with respect to playing positions of football players, whereas auditory reaction time has no significant variation. Reaction time is the duration between applications of a stimulus and onset of the response. Reaction time acts as a reliable indicator of the rate of processing of sensory stimuli by the central nervous system and its execution in the form of a motor response. Reaction time can be described into three types, (1) Simple reaction time:-here there is one stimulus and one response. (2) Recognition reaction time:-here there are some stimuli that should be responded to and other that should not get a response. (3) Choice reaction time:-here there are multiple stimulus and multiple responses. Reaction time, reflexes, quickness, or whatever the response is called, is a complex function that includes mental, physical, innate, and learned components (Thakur, 2016). But reaction time is especially important in football, because plays develop quickly, last only a short time, and feature massive athletes racing all about the field. Regardless of your position on the team, the quicker you're able to react to any set of circumstances, the better your chances of making the play (Herman, 2011). The change of the disjunctive reaction time was tested in selected training load zones of soccer goalkeepers. To expand the knowledge of the training load and its influence on the disjunctive reaction speed, which is one of the limiting factors of the individual game performance of goalkeepers, were provided. There was an assumption of changes in the disjunctive reaction time of goalkeepers from different age categories in the selected training load zones. A statistically significant relationship was evaluated between the value of the disjunctive reaction time by the observed goalkeepers in the calm zone (50-59 % HRmax) and in the 90-100 % HRmax zone (Obetko, Babic, & Peráek, 2019).

In terms of validity, evaluate the reproducibility and validity of two new tests designed to examine goalkeeper-specific technique. Twenty-six goalkeepers, each separated by one week, evaluated the reproducibility of the Sprint-Keeper Test (S-Keeper) and the Lateral Shuffle-Keeper Test (LS-Keeper). Construct validity was assessed among 40 goalkeepers. All participants were examined in vertical jump (CMJ and CMJ-free arms), acceleration (5-m and 10-m sprint) and goalkeeper-specific technique. Performance was measured, respectively, as total time correlations between repeated measures were high and significant ($r = 0.835 - 0.912$). The S-Keeper and LS-Keeper are reliable and valid tests to assess goalkeeper-specific technique (Rebello-Gonçalves et al., 2016).

The speed of the football players and goal keeper; football players have to avoid collisions and dodge some players that run over 20mph! Similarly, a goalie usually has only 0.3 seconds to react to a penalty kick. It is obvious that to stay one step ahead of the competition, you have to be able to process visual information more quickly to make faster plays (Neuro Tracker, 2017). The best keepers have good stats for all the essential attributes, diving, handling, positioning, reflexes, and kicking. The best goal keeper is the obvious choice with 90 diving, 94 reflexes, 88 positioning, and 85 handling. He will be expensive though. He has the best reflexes in this list, but he has not got the best kick for a keeper (Gilbert & East, 2018). 'What a reflex!' is a sentence that is often heard in professional soccer. Certainly, goalkeepers often don't have a fun time, with all the stimuli that catch their eye. Reaction speeds can be trained the same way that muscles can catch the ball before it hits the ground (Soccer Magazine, 2018).

Creating a reaction-time testing invention; to provide acquaintance with some of the issues in designing, conducting, analyzing, interpreting, and evaluating reaction-time (RT) experiments. These issues are best considered in relation to particular substantive questions and interpretations, but time limitations prevent this. The ideas to be presented reflect a personal and possibly idiosyncratic view of what types of questions are interesting and about how to answer them (Sternberg, 2010). Although the simple reaction time (SRT) tests, where subjects simply respond as fast as possible to the occurrence of a stimulus, are among the most basic measures of processing speed. SRTs were first studied by Francis Galton in the late 19th century (Johnson et al., 1985). A simple reaction time tester, it will randomly turn on an LED and measure the time it takes the user to press a button and then send the measurement to the user's computer (Instructables Circuits, 2018).

To investigate the influence of muscle soreness on the speed of performing a motor reaction speed task in football goalkeepers, the reaction time tester that was invented by the researcher team that followed, the

goalkeepers participated in two training sessions on each of the following two weeks. Before each training session, the same speed test was performed. Lap times for 5 m and 15 m were recorded. After the second training session each day, participants drew digital pain maps using a computer tablet, marking separate areas of the body where they felt muscle soreness. These data were consolidated and the total area was analyzed to investigate whether, throughout the training, there were any changes to the size of the area that was indicated to have MS (Muracki, 2020).

Thus, the technical staff selected the players preselected with a particular anthropometry and best performance, particularly agility and endurance, while the GKs had a different profile. Furthermore, chronological age played an important role in the whole selection process (Gil et al., 2014). Because football is a demanding and fast-paced sport, and the opposing players will always try to be ahead of you. Whenever you have the ball, the opposing players will always try to steal it from you, so you must have reaction time to keep the ball and make moves to get past them. You must also have reaction time to pass to your teammates properly and to get to the goal. Reaction time could be the difference between scoring and missing a goal. As a goalkeeper, you must have the reaction time to save shots from the opposing players. The reaction time of a goalie could be the difference between winning and losing a game (Panicker, 2019). This is the case why did the research team create the reaction time inventory tester to reflex of the football goalkeepers to estimate extrapolation in the average reaction time that are provided.

Conclusion

Research was integrated on the semi-experimental method for creating the reaction time tester for reacting reflex of the football goalkeeper inventory (RTTGI).. The RTTGI was assessed by seven professional experts such as electronics and wireless engineer, and the football goalkeeper trainers on the quality and potential invention with the Content Validity, Index of Item Objective Congruence (IOC) value, Reliability, and Objectivity value of the RTTGI. Statistically significant was analyzed with means, standard deviation and Pearson's product moment correlation coefficient. administration to a sample size consisted of 20 football goalkeepers who participated in competitions in the Thailand University League Cup in 2019 (U-League 2019) in two weeks at the Kasetsart University Stadium Club with the estimated extrapolation in the average reaction time was controlled and the RTTGI time was recorded by the two testers.

The RTTGI includes a hand-tactile indicator light, a foot-touch indicator light, and a digital test display that modified the original RT of Zollo et al. (2019), Pfister et al. (2014) and Ousey et al. (2018) . In terms of the efficiency and effectiveness of the RTTGI of the content validity analysis indicated that of 89% with the IOC that higher than the standardized omit criteria value at 85%, the reliability as 0.88, the time scorings were recorded by two testers for assessing the 20-football goalkeepers on their objective value analysis by the two testers are the same values, significantly. Perceptions of the 7 professional experts of Appropriateness suitability analysis (ASA) on the fore scales, namely: The utilization, possibility, suitability, and accuracy scales indicated their performance at the Very Suitable level on all four scales.

Limitation and study forward

The RTTGI created that has been attributed for this research. Although it has assessed the quality and potential by the professional experts, but if compared to the international standard, therefore it is still unable to be of equal quality or can be invented for business.

Due to the U-League Cup, there will be more than 20 teams participating in the competition, but each team is from a different university. Asking for permission and permission from the head coach to borrow goalkeepers as a research sample, there will be problems with the secret skills of each team's football goalkeepers. The time schedule of the empirical research data was not sufficiently detailed.

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