# Visual Perception of Sport Coaches for Some Kinematic Variables of the Gymnastic Vaulting Table

الإدراك البصرى للمدربين لبعض المتغيرات الكينماتيكية لمهارة القفز على جهاز القفز

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#### **Abstract**

**Aim**: To examine the visual perception of sports coaches for some kinematic variables of the gymnastic vaulting table. Methods: The researcher used the descriptive method in this study, and used Ten Sports Coaches of gymnastic as subjects of this study from the physical education faculty at Yarmouk University. Study tools: The researcher prepared a special questionnaire, including 38 items related to kinematic variables and some random mistakes for the Vaulting Table skill phases. The coaches watched players' performance, then after every player's vault attempt, the questionnaire was distributed directly to sports coaches. The researcher placed three sunny digital video cameras in different locations perpendicular to the vault table apparatus, ten undergraduate male gymnastic players from Yarmouk University - physical education department was recorded while they performed vault skills. The researcher analyzed the videotaped of the vaults of gymnastic players, then the researcher compared the videotape with the responses of Sport Coaches on questionnaires to identify the ability of sports coaches' visual perception.

To analyze the player's vault videotape, the researcher used a computer program called (Super decoder) for Vaulting Tables kills analysis. The researcher computed statistics in SPSS statistic software, like percentages and repetitions. **Results**: Study results were: "the weakest percentage in visual perception ability was in the pre- and post-flight phases. The strongest percentage in visual perception ability was in the approach phase. Watching kinematic variables of sports skills is not enough to distinguish skills, especially fast ones. Feedback by watching the performance does not improve the skill level in fast movements". **Recommendations**: The researcher of this study recommends coaches focus on recruiting more senses and different coaching aids in increasing coaching visual perception ability and proper understanding of movement and thus motor learning. Coaches should familiarize themselves with different coaching and training sources related to their sport, and learn how to recruit them in different training situations.

**Keywords:** Motor learning. Visual Perception, kinematic, Sport Coaches.

### ملخص

أهداف البحث: هدفت الدر اسة إلى التعرف على الإدر اك البصري للمدربين لبعض المتغير ات الكينماتيكية لمهارة القفز على جهاز القفز. منهجية البحث: استخدم الباحث المنهج الوصفي في هذه الدراسة، اشتملت عينة الدراسة على (10) من مدربي الجمباز من جامعة اليرموك في كلية التربية الرياضية، وتم استخدام استمارة خاصة تحتوي على 38 فقره ترتبط ببعض النواحي الكينماتيكية والأخطاء الشائعة لمراحل مهارة الوثب على جهاز القفز، قام مدربو الجمباز بمشاهدة أداء لاعبي الجمباز وبعد أداء كل لاعب كان يتم توزيع الاستبانة بشكل مباشر على المدربين ليتم الأجابة على الاستبانة مباشرة ثم تجمع بنفس الوقت، قام الباحث بوضع ثلاث كاميرات رقيمة سوني في مواقع مختلفة بشكل عمودي مع اتجاه جهاز الجمباز اي مرحلة الحركة كاملة، عشرة لاعبى من لاعبى الجمباز في جامعة اليرموك تم تصوير اداء مهارة الوثب على جهاز القفز. ثم تم تحليل شريط التصوير للمهارة حيث قورن التصوير مع إجابات المدربين على الاستمارة لمعرفة الإدراك البصري لدى مدربي الجمباز للمتغيرات الكينماتيكية لمهارة الوثب على جهاز القفز في الجمباز، تم استخدام برنامج (سوبر ديكودر) في للتحليل الحركي لتحليل الصور وتقطيعها لمقارنة الإدراك البصري للمدرب مع ما تم فعلا من مهارات الجمباز. استخدم الباحث التكرارات والنسب المئوية في التحليل الإحصائي. النتائج: وقد أظهرت نتائج الدراسة أن أضعف نسبة في قدرة الإدراك البصري للمدربين كانت في مرحلتي الطيران الأول والثاني، وأقوى نسبة في قدرة الإدراك البصري للمدربين كانت في مُرحلة الآقتراب، مشاهدة العوامل الكينماتيكية لا تكفي لتميز

المهارات وخصوصا السريعة، التغذية الراجعة من خلال مشاهدة الأداء لا تكفي للتقدم بالمستوى المهاري في الحركات السريعة. الخلاصة: يوصي الباحث على تركيز المعلمين لتوظيف حواس أكثر ووسائل تدريبية مختلفة لزيادة نسبة قدرة الإدراك البصري للمدربين والاستيعاب السليم للحركة وبالتالي التعلم الحركي. أن يتعرف المدرس على مختلف المصادر التي تتعلق بمادة تخصصه، وكيف يوظفها في المواقف التعليمية المختلفة.

الكلمات المفتاحية: التعلم الحركي، الإدر اك البصري، الكينماتيك، مدرب الرياضي.

### Introduction

Visual perception is a complex process using the sensory nervous system by the Sports Coaches to receive, analyze and understand sports skills, not only slow-motion skills but also fast motion skills, which is fruitful in sports games, especially in gymnastic games. (Shahrour, 2017, P. 46), (Shafer, Solomon, Newell, Lewis, Bodfish, 2019), (Dember, Wiliam, & Jolyon 2023).

Sport Coaches as a part of the sports field attempt to improve the performance of players by providing the right instructions that come from observing the skills of players and then giving correct feedback through their visual perception.

The visual system has the difficult task of comprehending a difficult three-dimensional world from two-dimensional pictures on each retina. Pictures of things at a distance other than at the fixation plane are projected to dissimilar relative positions on the two retinas (Shinsuke, Michael, and Ichiro, 2001, P. 12340).

Vault is one of six apparatus for men of the artistic gymnastics sport, The gymnastic technique can have a large effect on performance. The technique of Vaulting has an important influence on real performance; therefore, a lot of time is spent on improving the neuromuscular coordination on motor skills of gymnastic players in the practice of long-term training, gymnasts exhibit different patterns of neuromuscular coordination aimed to implement. (Bartłomiej, *et al.* 2021. P15). The method of training motor skills in gymnastics was a coach's visual and verbal instructions provided during the gymnastic training. through video pictures of expert rowers or pictures of the subject.

An - Najah Univ. J. Res (Humanities). Vol. 38(2), 2024

In general, the coach gives some verbal keys with his visual perception by watching gymnastic players in teaching and training sessions with proper and safe feedback.

(Bartłomiej, *et al.* 2021. P15) Indicated that Safe and proper landings are essential elements of gymnastics circumstances. Long-term training guides to specific neuromuscular adaptations which are yet to be explored in periods of gymnastic landings

### The problem statements

The researcher wants to examine the visual perception of coaches because it has the most important part in training: giving direct, suitable feedback for gymnastic players to fix their skills will improve the sport in local community. But if the coach doesn't get the correct visual perception, the coach will make the wrong decision and give the wrong feedback, and we will not develop our sport field. (Anlló, Watanabe, Sackur, & de Gardelle, 2022, P. 889) said that verbal clues can bias perceptual decisions unless the information they provide is wrong. What makes a person more or less susceptible to liking influences.

Visual perception by sport coaches is a strategy that can provide appropriate feedback to gymnastic players while also contributing to motor skill development. When the unknown motor abilities are equivalent to the known motor skills, feedback is more effective (Guadagnoli, & Kohl, 2001, P. 217), (Darden, 1997, P.31). As a result, the players must become acquainted with the new motor abilities.

The gymnastic vaulting table comprises particularly quick talents like one-shot skills that require a competent coach's eye to notice and provide direct feedback to rectify incorrect skills immediately after doing the vault.

(Darden, 1997, P.31) examined the uses of the demonstration of "incorrect motor skills" concurrently with some external feedback from a trainer. The uses demonstrated to be more significant than those of observing a professional model

## **Aims of Study**

To examine the visual perception of sports coaches for some kinematic variables of the gymnastic vaulting table.

### **Background literature**

Training and teaching success for sport coaches is usually regarding to the ability to perceive players information skills. Visual perception is an important element for training, teaching gymnastic vault table skills and developing the complicated skills of vault table (vault horse) gymnastic sport in best strategy.

visual perception can give the right feedback that enhances performance. (Tzetzis, Zachopoulou & Kioumourtzoglou,1999, P. 137), (Leslie, 1998), (Sanders, 1995, P. 665). Therefore they assure this statement by their studies as shown below:

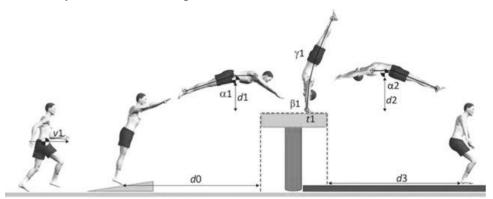
(Tzetzis, Zachopoulou & Kioumourtzoglou, 1999, P. 137) divided unsystematically 75 students into 3 classes. class 1 viewed a video of a trained model, class 2 watched a video of their performance with spoken instruction from a coach, and class 3 obtained coach instruction. Motor skills were calculated 24 hours after monitoring the video and practicing the skills. The gigantic motor skill improvement was in skiers as a result of both visual modeling and spoken feedback (Group 2).

In (Leslie, 1998) study figured out that Video-computerized feedback integrated with a video of a professional model has improved baseball hitting performance

(Sanders, 1995, P. 665) indicated that video feedback provided in two separate sessions. Experienced swimmers improve their technique in a period using both coaching and visual feedback

The were many researches split the vault skills into phases, the researcher mention those who concentrated on every single phases of the vault like: (Penitente, Merni, Fantozzi, & Perretta, 2007), (Velickovic, Petkovic, & Petkovic, 2011. P25); pre-flight phases (Koh & Jennings, 2007, P. 1256), (Yeadon, King, & Sprigings, 1998, P. 349), or post-flight

phases (Takei, 1992, P. 87); (Yeadon, Jackson & Hiley, 2014, P. 3143). This study will focus on all phases of the vault.



**Figure (1):** Seven vault phases; 1) approach, 2) hurdle onto the springboard, 3) springboard support, 4) pre-flight, 5) vault support, 6) post-flight, and 7) landing, from (Atiković & Smajlović, 2011, P. 91). For the study plan, the researcher split the vault phases into six phases (approach, springboard support, pre-flight, vault support, post-flight, and landing) he combined the hurdle onto the springboard phase with the springboard phase.

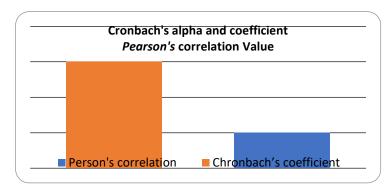
The above studies had been provided an overview of the visual perception, how using it in various fields especially in sport, also include research on vault table (horse vault), especially how they split the phases of this sport. Researcher had collected those several studies relating to the visual perception of sport coaches on developing gymnastic vault table skills by giving correct feedback for players.

**Methods:** (10) Sport Coaches (5) male and (5) female coaches from the academic faculty staff off physical education at Yarmouk University, in the Hashemite Kingdom of Jordan were selected randomly to participate in this study.

Three sonny digital video cameras were placed in different locations perpendicular along the vault table apparatus, to record Ten male gymnastic players performing vault skills from Yarmouk University -

physical education faculty. Sports coaches watched the gymnastic vault performance of players then after every vault attempt the questionnaire was distributed directly to sports coaches. The researcher analyzed the videotaped gymnastic vaulting, then compared it with the responses of Sport Coaches on the questionnaire to identify the ability of visual perception of sports coaches. To analyze the vault of player video tape researcher used a computer program called (Super decoder) for Vaulting Tables kills analysis.

**Questionnaire**: A special questionnaire is divided into two sections. In the first section personal information, coaches gave demographic-related information such as gender, education level, coaching years, and age, second section questions related to vault skill phases including six phases [1-(approach) include 5 kinematic questions, 2-(springboard support) include 8 kinematic questions, 3-(pre-flight) include 10 kinematic questions, 4-(vault support) include 7 kinematic question, 5-(post-flight) include 3 kinematic questions and 6-(landing) include 5 kinematic questions] and every phase divided to kinematic variable items with total 38 items, as shown in appendix (1). The reliability and validity of the questionnaire were calculated. Internal consistency is the degree to which items within a ranking are correlated with each other. Thus, Chronbach's coefficient and Pearson's correlation was utilized, and a magnitude of at least 0.8 was considered as an index of reliability, as in figure (1).



**Figure (1):** Cronbach's alpha and coefficient Pearson's correlation Value.

An - Najah Univ. J. Res (Humanities). Vol. 38(2), 2024

**Data collection procedures**: After every gymnastic player perform his vault, the researcher and volunteers distribute directly the questionnaire among coaches to respond to what they had been percept visually about gymnastic vault skills. The questionnaires were administered by the researcher and his colleagues.

After that the researcher compared sport coaches responses on questionnaire kinematic question, with the real attempt vault by using superdecorder program which trimmed the videotaped into single pictures at the moment that give the response point manually for comparing.

**Statistics analyses**: SPSS package used in data statistical analysis like Chronbach's coefficient, Pearson's correlation, percentage and repetition.

### **RESULTS**

**Table (1):** Repetitions and Percentages for Visual Perception of Coaches for Some Kinematics Variables of Gymnastic Vaulting Table.

Technical phase for yault skill	Total Views	Correct Visual Perception		Wrong Visual Perception		(Not viewed) No Visual Perception	
vauit skiii		R	P	R	P	R	P
approach	500	210	42 %	275	55 %	15	3.0%
Springboard support (Take of)	800	304	38 %	443	55.4%	53	6.6 %
pre-flight	1000	387	37.8%	549	54.9%	73	7.3 %
vault support	700	287	39.7%	329	47 %	93	13.3%
post-flight	300	78	26.1%	162	54.2%	60	19.7%
and landing	500	207	41.4%	175	35%	118	23.6%
Total	3800	1455	38.3%	1933	50.9 %	412	10.8%

<sup>\*(</sup>R) Repetition, (P) Percentage

Table (1) Visual Perception of Coaches for Kinematics Variables of Gymnastic Vaulting Table.

The results from the table indicated that the approach phase had the highest correct percentage of visual perception (42.0%), followed by the landing phase (41.4%), and the vault support phase (39.7%) in third place. then Springboard support (Take off) phase arrived with percent (38%) more over in final positions pre-flight and post-flight phases came successively with percentage (37.8%) (26.7%), and the total visual perceptual of coaches percentage was (38.3%).

Regarding data acquired retrospectively from questionnaire responses by Sport coaches.

This study figured out that the Visual Perception of Coaches ability was relatively weak, as the table shows that the percentage of the total visual perception ability of the skill was (38.3%). The reason for this may be that perceiving the movements by observing the kinematic factors is not sufficient to distinguish the skills, especially the fast ones, without recognizing the kinetic factors causing the movement, and this requires a complete analysis of the movement to assist the visual perception, as a result, it is not possible to rely on visual perception only to realize sports movement. These results agreed with the study of (Jeroen, Smeets & Eli, 2001, P. 1006). That states" As vision is closely related to the degree of information available to the individual about the performance he watches, and this is consistent with the study.

#### Conclusion

Results indicate the weakest percentage of visual perception ability was in the pre and post-flight phases. The strongest percentage in visual perception ability was in the approach phase.

Watching kinematic variables of sports skills is not enough to distinguish skills, especially fast ones. Feedback by watching the performance is not sufficient to improve the skill level in fast movements.

The researcher recommends Coaches focus on recruiting more senses with different coaching aids to increase their perception ability and proper understanding of movement and thus motor learning, coaches should familiarize themselves with different coaching and training sources related to their sport, and how to recruit them in different training situations.

Additionally, to improve sport coaches visual perception, coaches can use videotape to gain the proper perspective by watching the recording repeatedly and doing so until they have it. Then, using that perspective, they can give players the proper feedback and help them develop their skills. and conduct workshops aimed at enhancing sport coaches' visual perception

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# Appendix 1

Appi	Approach phase				
1	Did the player run as follow: a) straight b) zigzag c) not specified				
2	Did the player run on his. a) Full feet. b) Metatarsals (parts of the front foot)				
3	Were the final steps of the player in approach running.				
	a) Bigger than the previous steps. b) less than the previous steps.				
4	Did the player at the end of the approach run?				
	a) Take a step b) hesitation in steps c) Nothing was done				
5	Did the movement of the arms and legs while running move as follows:				
	a) The right arms with the left leg as a sprint. b) The arms are not compatible				
C	c) The arms are stiff while running.				
	ngboard support phase				
1	Did the player jump on springboard.				
2	a) with one foot only b) with two legs c) unspecified				
2	Did the (landing) touching springboard of player.  a) With the metatarsals (the front parts of the foot) together.  b) only with				
	one foot c) With feet together				
3	Were the player's arms when (landing) at the moment of touching springboard.				
	a) side down b) sideways c) forward d) up				
4	Was the player landing on the part of springboard:				
	a) The first third b) The middle c) The last third				
5	Was the angle of the landing of the body at the moment of touching the				
	springboard at an angle.				
	a) Ninety off the horizontal (vertical) axis				
	b) Bigger than ninetieth from the horizontal axis (bigger than the vertical)				
6	c) less than one-ninth from the horizontal axis (less than the vertical)  Were the trunk and head when landing at the moment of touching the				
U	springboard.				
	a) head and trunk are straight b) The head is slightly forward				
	c) The head is slightly back				
7	Were the player's knees at the final push at the moment of leaving the				
	springboard?				
	a) not flexed b) little flexed c) much flexed				
8	Were the player's head when landing at the moment of touching the springboard.				
	a) straight b) slightly forward c) slightly back				
	Pre-flight phase				
1	Was the angle of flight of the player's body at the moment of leaving the				
	springboard at an angle?				
	a) Ninety with the horizontal (vertical) axis				

An - Najah Univ. J. Res (Humanities). Vol. 38(2), 2024

	11)					
	b) greater than ninetieth from the horizontal axis (greater than the vertical)					
_	c) less than one-ninth from the horizontal axis (smaller than the vertical)					
2	Were the legs at the moment of flight after the springboard flying over the					
	horse?					
	a) joined and in a straight-line b) Not joined together c) flexion in the knee					
	joint (unspecified)					
3	Were the arms at the moment of flight after leaving the springboard and before					
	flying over the horse?					
	a) They are moved forward and upward from the head					
	b) Moved forward and down from the head					
	c) Moved forward and at the same level as the head					
4	Were the legs while flying over the horse and before support on the hands					
	a) joined and in a straight-line b) Not joined together c) flexion					
	in the knee joint (unspecified)					
5	Were the arms while flying over the horse and before support on the hands.					
	a) They are stretched forward and upward from the (head) or trunk					
	b) stretched forward and down from the head					
	c) stretched forward with the same level of the head.					
6	Were the legs while flying over the horse and before support on the hands.					
	a) With the trunk level b) Above the trunk level c) Below the trunk level					
7	Was the trunk while flying over the horse and before support on the hands.					
0	a) slightly arched (concave) b) convex c) straight					
8	Were the player's body while flying over the horse and before support on the					
	hands.					
	a) with the horizontal plane b) lesser than the horizontal plane.					
9	c) greater than the horizontal plane  Were the player's body at the end of flying over the horse and before support on					
9	the hands.					
	a) greater than the horizontal plane over the horse.					
	b) with the horizontal plane above the over.					
	c) Below the horizontal level over the horse.					
10	Were the thigh and knee joints at the end of the first flight and before the					
10	moment of support with the hands:					
	a) In a straight line. c) flexion in the knee joint. b) Flexion in the hip joint.					
	d) Flexion in the hip and knee joints					
Vaul	Vault support phase					
1	Was the supporting on the horse area?					
	a) on the first third of the horse. b) on the second third (middle) of the horse.					
	c) on the third of the horse					
	1 -/					

2	Was the supporting on the horse?			
-	a) with both hands b) with one hand			
	c) not touching the horse			
3	Were the angles of the joints of the elbows and shoulders at the moment of			
	supporting the hands on the horse?			
	a) In a straight line. b) Flexion in the elbow joints.			
	c) Flexion in the shoulder joints. d) flexion in the joints of the elbows and			
	shoulders.			
4	Were the trunk and the two legs at the moment of the supporting arms on the			
	horse?			
	a) With the horizontal plane over the horse.			
	b) higher than the horizontal level over the horse.			
	c) Below the horizontal level over the horse.			
5	were the two legs opened at moment of?			
	a) supporting on the horse b) before supporting on the horse			
	c) after supporting on the horse			
6	Were the two legs at the moment of the supporting arms on the horse?			
	a) Over the level of the hip joint b) Below the level of the hip joint			
	c) With the same level as the hip joint			
7	Were the arms at the moment of pushing the horse with the arms after			
	supporting, moving to the direction of?			
	a) forward up b) forward down c) to the side			
	-flight phase			
1	Did the player fly after supporting on a horse?			
	a) As far and up as possible from the horse. b) near and low on the horse.			
	c) Far and low from the horse.			
2	The moment the body reaches its highest point (height)?			
	a) stretching all angles of the joints of the body in a straight line			
	b) Bend at the knees and hip joint.			
	<ul><li>c) flexion at the shoulder joint and elbows.</li><li>d) Bend at the knee joint only.</li></ul>			
3				
3	Are the two legs joined after pushing (letting off) the horse?			
	Are the two legs joined after pushing (letting off) the horse?  a) When the body reaches its highest height.			
	Are the two legs joined after pushing (letting off) the horse?  a) When the body reaches its highest height. b) before the body reaches its highest height.			
3	Are the two legs joined after pushing (letting off) the horse?  a) When the body reaches its highest height. b) before the body reaches its highest height. c) After the body reaches the highest height and before landing.			
3	Are the two legs joined after pushing (letting off) the horse?  a) When the body reaches its highest height. b) before the body reaches its highest height. c) After the body reaches the highest height and before landing. d) On landing.			
	Are the two legs joined after pushing (letting off) the horse?  a) When the body reaches its highest height. b) before the body reaches its highest height. c) After the body reaches the highest height and before landing. d) On landing. e) It did not include the two legs.			
	Are the two legs joined after pushing (letting off) the horse?  a) When the body reaches its highest height. b) before the body reaches its highest height. c) After the body reaches the highest height and before landing. d) On landing. e) It did not include the two legs.  Landing phase			
1	Are the two legs joined after pushing (letting off) the horse?  a) When the body reaches its highest height. b) before the body reaches its highest height. c) After the body reaches the highest height and before landing. d) On landing. e) It did not include the two legs.			

2	Was it at the moment of touching the ground with the body?			
	a) flexion of the knee joints and thigh	b) flexion of the knee joint		
	c) flexion of the hip joint			
3	Are the arms moved at the moment the feet are fully placed on the ground?			
	a) side of the body	b) to the forward of the body		
	c) to the side lower the body			
4	Were the knees after landing and standing on the ground?			
	a) full extension b) full flexion	c) partial flexion		
5	the player's body after landing on the ground was with:			
	a) the body is stable	b) the body is moving forward		
	c) the body is moving backwards			
38	Total			