LA PERFORMANCE DELL'ATLETA: COME MIGLIORARLA?

METODOLOGIE INTEGRATE DI VALUTAZIONE E ALLENAMENTO SPECIFICO

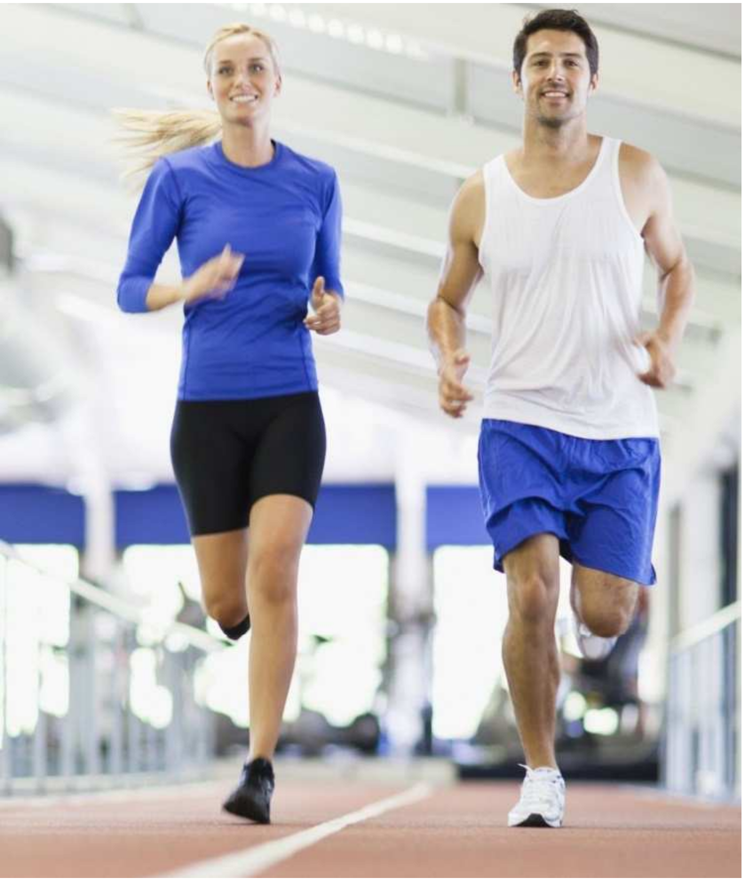
Dott. Tiziano Testa

VISTA
O
VISIONE

RIDEFINIZIONE


SONO SITUAZIONI ABITUALI?

SITUAZIONI E POSIZIONI DI SGUARDO DIVERSE



ALLENIAMO TUTTO DELL’ATLETA?

VEDERE NELLO SPORT

- Pertanto una serie di abilità visive devono essere integrate e allenate per poter programmare la giusta risposta motoria
- La Visione deve essere considerata come un processo percettivo piuttosto complesso.
- La Visione è un insieme di abilità visive divisibili in funzioni :

- Visive di base
- Visuo-motorie
- Processi Percettivi

FEEDBACK VISIVO

Percepire

Elaborare

Rispondere

STUDI

- Gli atleti d'elite raggiungono migliori performance sportive grazie ad una certa superiorità visiva
- Erickson 2007
- Gregg 1987

- Studi mostrano che la superiorità visiva negli atleti non è superiore di base ma piuttosto è da ascrivere ad un uso più efficiente delle informazioni visive a disposizione
- Erickson 2007

STUDI

- Nella gestione dello spazio la visione interviene per l’83%
- Formenti 2008

- Nel Sistema Tonico Posturale , l’occhio è il principale organo sensoriale, dal quale provengono la maggior parte delle informazioni esterocettive dirette al SNC; inoltre la vista è la principale sorgente della sensazione cinestetica.
- Herman et al 1985

LA PERCEZIONE

La percezione visiva è un'attivita' essenzialmente mentale.

Il cervello non interviene solo per definire un'immagine, ma anche per collegare una percezione visiva ad altre impressioni sensoriali.

La percezione , può aver luogo soltanto mediante l'informazione proveniente dal rispettivo senso. In definitiva , il relativo senso da cui origina la percezione-interpretazione motoria è il senso cinestetico, il quale veicola ai centri superiori dell'encefalo i dati informativi, inerenti alla relazione tra il soggetto e la propria occupazione spazio-temporale

LA PERCEZIONE

La percezione avviene solo se sussistono 3 condizioni:

- Un oggetto del mondo che emetta e/o rifletta qualche tipo di energia.
- Un tipo di energia che sia in grado di modificare gli organi sensoriali
- un sistema di elaborazione che sia in grado di decodificare e interpretare le modificazioni che l'energia ha prodotto negli organi periferici di registrazione sensoriale

AFFERENZE SUL SISTEMA VISIVO

- Il sistema visivo è uno dei principali informatori del cervello in merito alla postura.

- Ma altrettanto vero che un atteggiamento posturale errato influenzando la posizione della testa e la mobilità del collo puo’ modificare la posizione degli occhi.


Sequenza organizzativa della
percezione sensoriale
100%
Gusto
Olfatto
Tatto
Udito
Visione
0%
Anni 1 2 3 4 5 6

Gli occhi guidano il gesto sportivo

“SKILLS VISIVI - EFFICIENZA VISIVA”

ACUTEZZA VISIVA STATICA

ACUITÀ VISIVA /SENSIBILITÀ AL CONTRASTO CON ABBAGLIAMENTO

ACUTEZZA VISIVA DINAMICA

CAMPO VISIVO E CONSAPEVOLEZZA PERIFERICA

PERCEZIONE DELLA PROFONDITÀ

FUSIONE CROMATICA –FUSIONE SENSORIALE

PERCEZIONE FIGURA SFONDO

MEMORIA VISIVA /ATTENZIONE VISIVA

TEMPO DI REAZIONE VISIVA

TIMING

VISUALIZZAZIONE

DOMINANZA

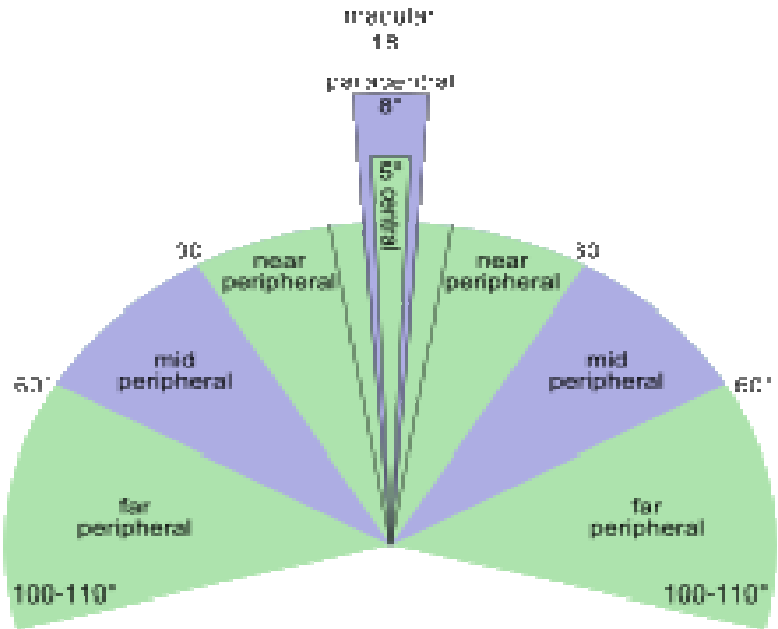
COORDINAZIONE OCCHIO MANO –OCCHIO PIEDE

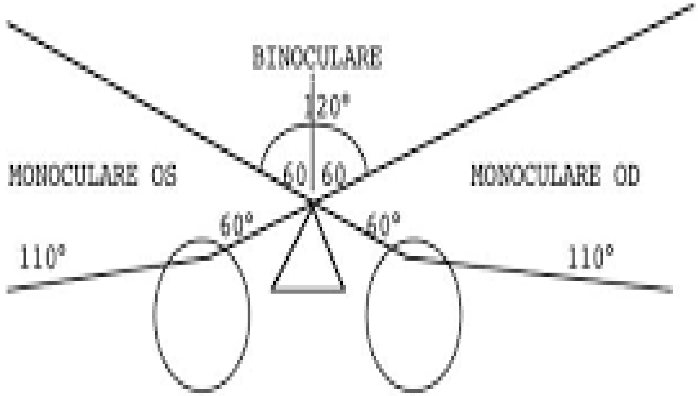
ORGANIZZAZIONE ED ORIENTAMENTO SPAZIALI

CONSEGUENZE DEGLI ERRORI VISIVI NELLO SPORT

- Riduzione di rendimento
- Inesattezze specifiche
- Incapacità specifiche
- Grossolana riduzione del rendimento
- Rischio vitale

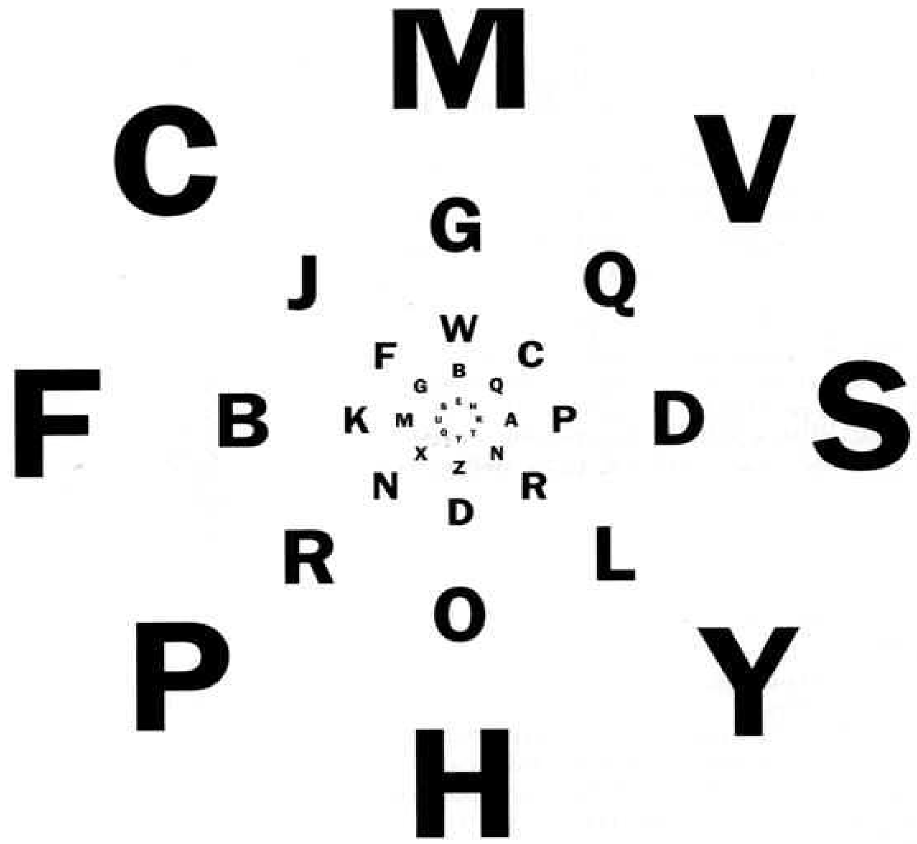
VISIONE PERIFERICA

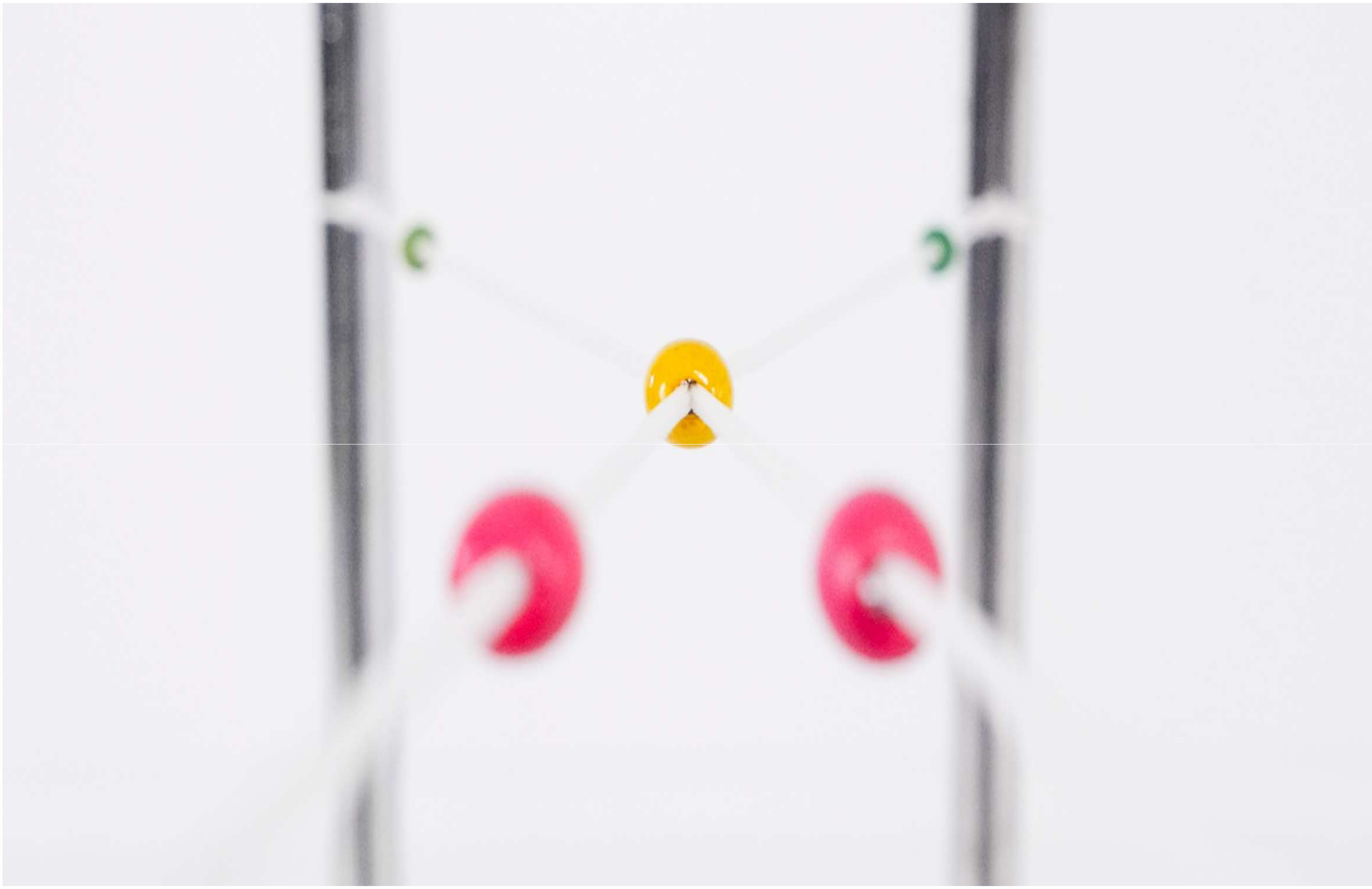


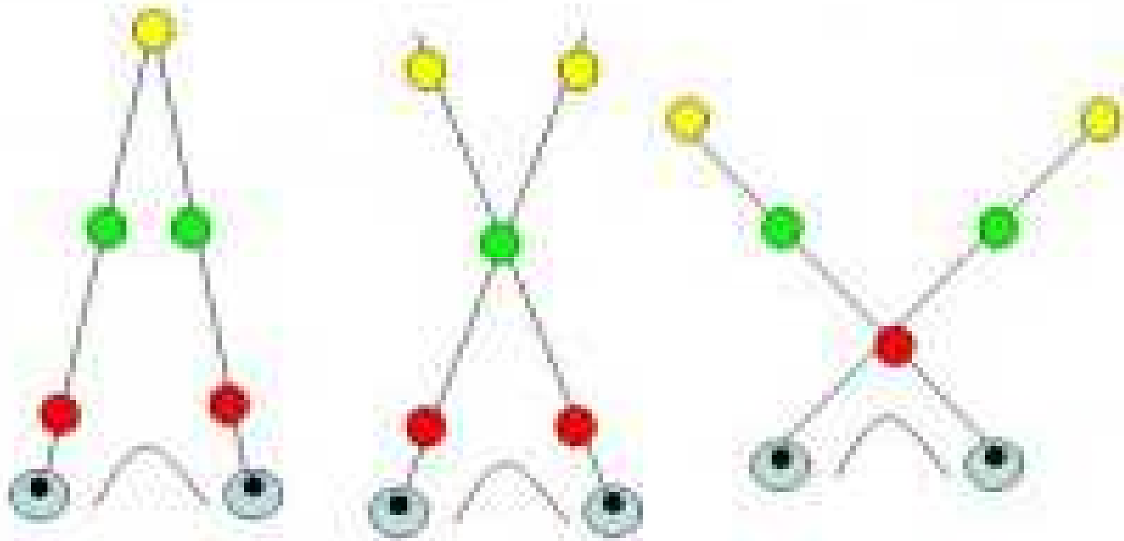


STRATEGIA

Tramite canali di stimolazione privilegiati (non invasivi) si potenziano la percezione e i tempi di risposta.
Il beneficio si estende alle altre abilità.


M V S Y H P F C
G Q D L O R B J
W C P R D N K F
B Q A N Z X M G





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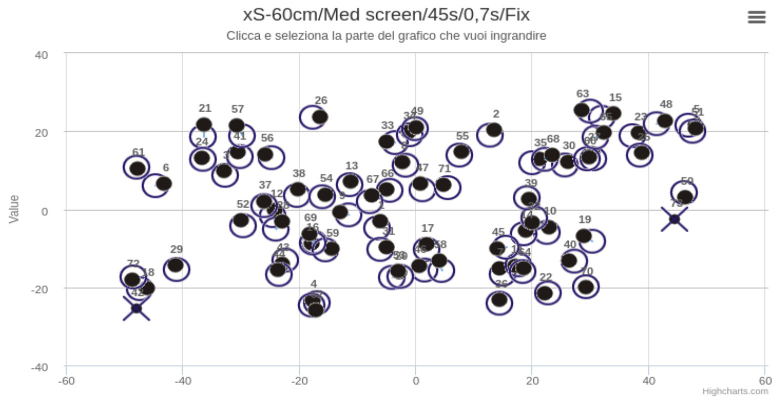
Email: [redacted]
Data di nascita [redacted]



Posizione target

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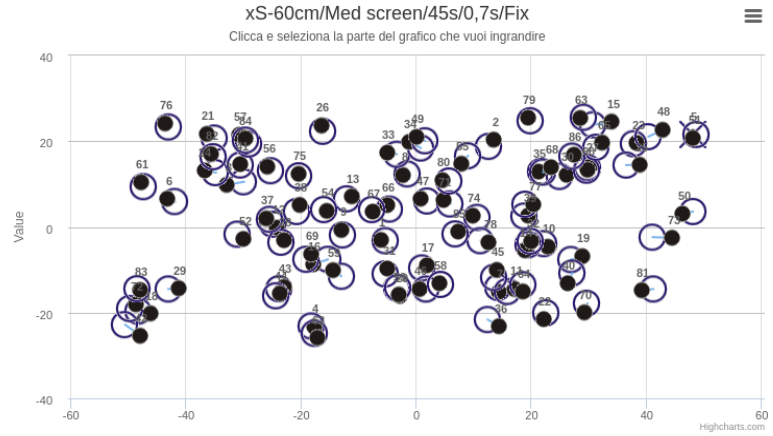
Immagini colpite: 68
Immagini al secondo: 1.5
Tempo totale: 45.0
Tempo di reazione medio: 0.57

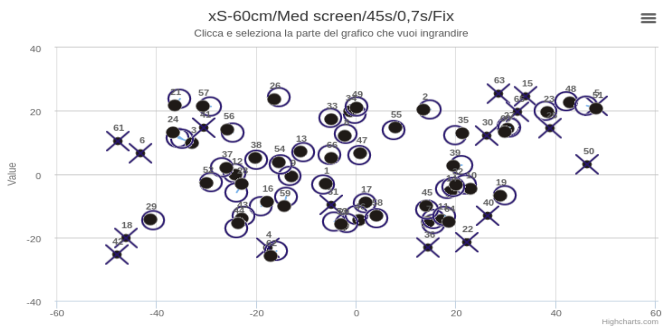
Email:
Data di nascita: [redacted]



Posizione target

Data esecuzione: 2018-05-08 09:43:56
Immagini colpite: 76
Immagini al secondo: 1.7
Tempo totale: 45.0
Tempo di reazione medio: 0.47

Nome utente: mi[redacted]
Email: [redacted]
Data di nascita: [redacted]



Posizione target

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Immagini colpite: 45
Immagini al secondo: 1.0
Tempo totale: 45.0
Tempo di reazione medio: 0.61

Nome utente: [redacted]sley
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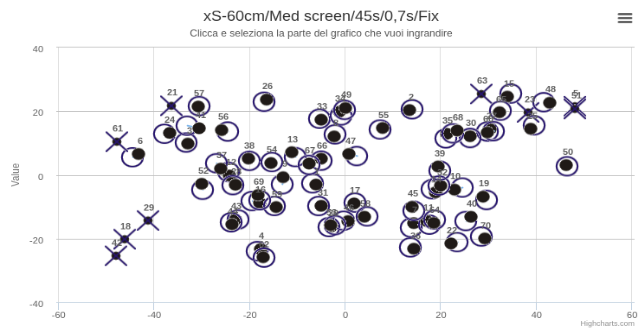
Data di nascit[redacted]



Posizione target

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Tempo di reazione medio: 0.58

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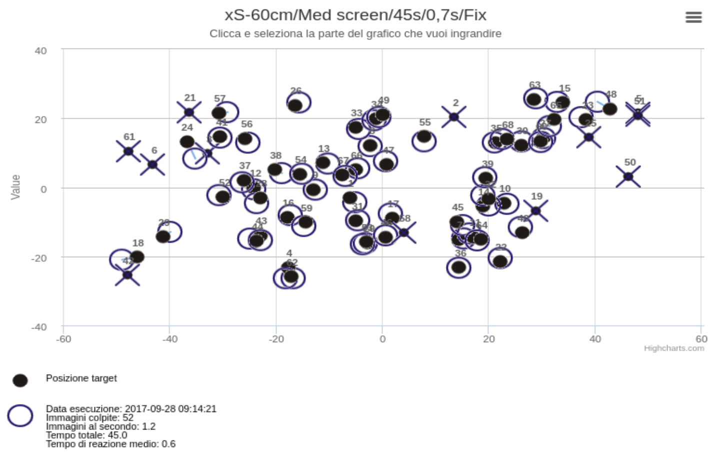
HUMAN VISUAL TRAINING



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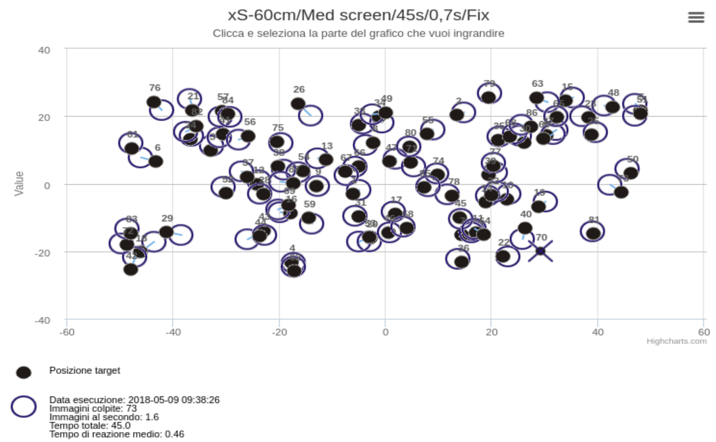
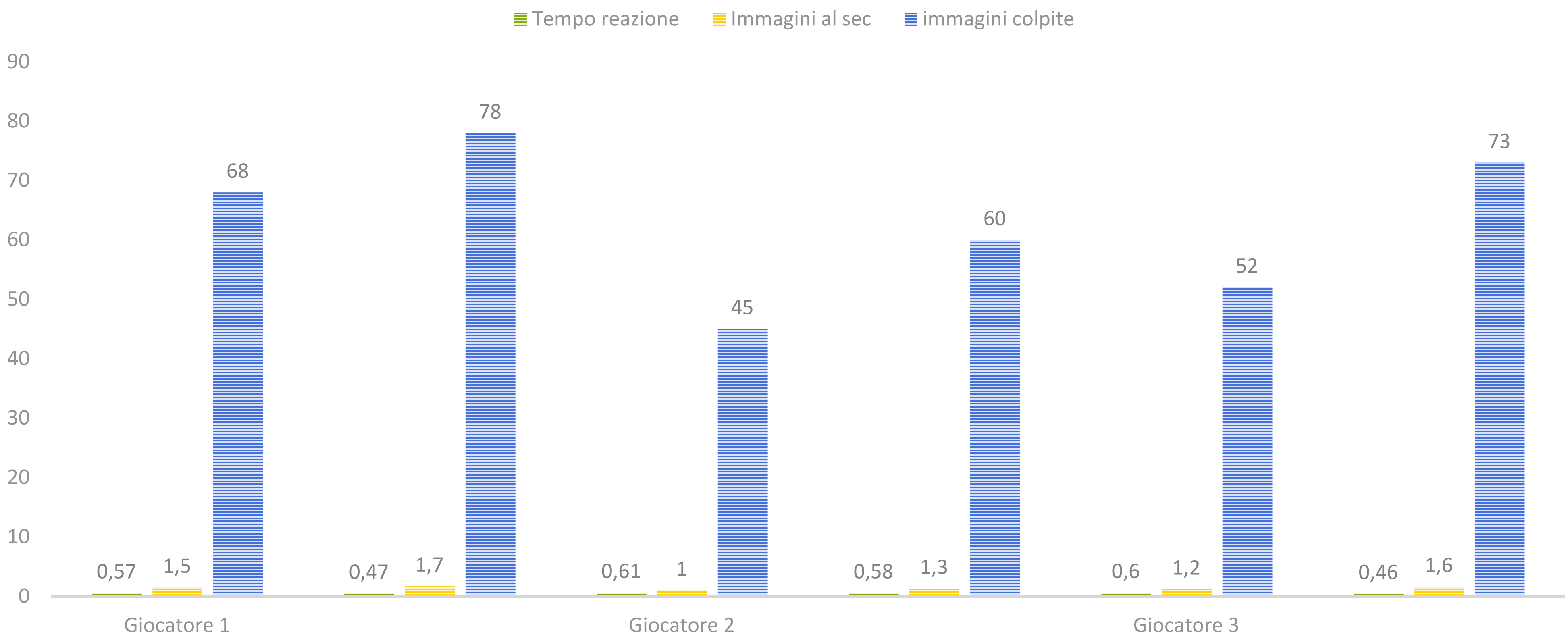
HUMAN VISUAL TRAINING



LOCALIZZAZIONE SPAZIALE VISIVA CON COORDINAZIONE OCCHIO-MANO IN EQUILIBRIO STATICO.



frontiers in
HUMAN NEUROSCIENCE

ORIGINAL RESEARCH ARTICLE
published: 11 November 2014
doi: 10.3389/fnhum.2014.00913

Dynamic peripheral visual performance relates to alpha activity in soccer players

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Many studies have demonstrated the relationship between the alpha activity and the central visual ability, in which the visual ability is usually assessed through static stimuli. Besides static circumstance, however in the real environment there are often dynamic changes and the peripheral visual ability in a dynamic environment (i.e., dynamic peripheral visual ability) is important for all people. So far, no work has reported whether there is a relationship between the dynamic peripheral visual ability and the alpha activity. Thus, the objective of this study was to investigate their relationship. Sixty-two soccer players performed a newly designed peripheral vision task in which the visual stimuli were dynamic, while their EEG signals were recorded from Cz, O1, and O2 locations. The relationship between the dynamic peripheral visual performance and the alpha activity was examined by the percentage-bend correlation test. The results indicated no significant correlation between the dynamic peripheral visual performance and the alpha amplitudes in the eyes-open and eyes-closed resting condition. However, it was not the case for the alpha activity during the peripheral vision task: the dynamic peripheral visual performance showed significant positive inter-individual correlations with the amplitudes in the alpha band (8–12 Hz) and the individual alpha band (IAB) *during* the peripheral vision task. A potential application of this finding is to improve the dynamic peripheral visual performance by up-regulating alpha activity using neuromodulation techniques.

Keywords: dynamic peripheral vision, relationship, alpha activity, soccer player, individual alpha band

INTRODUCTION

Human visual system is composed of central vision and peripheral vision. As an important constituent part of vision, peripheral vision occurs outside the central field of view and is responsible for the peripheral visual information collection. According to the biological constitution of human eyes, it is well-known that retina is made up by two types of photoreceptor cells, namely rod cells and cone cells. Cone cells are mostly concentrated in the central area of the retina and less densely populated in the periphery, while rod cells are commonly distributed in the outer edges of the retina and peripheral vision mainly employs rod cells. When an object exceeds the central visual field, humans have to make saccadic eye movements to search the object, which will bring parts of the object into the central vision. The orientation and span of eye movements use the visual information from peripheral vision. Peripheral vision provides plentiful visual information outside the central visual field and is important for feature recognition and object identification because it directs eye movements in neutral search tasks (Torralba et al., 2006) and provides the visual information as important triggers for saccades (Luo et al., 2008).

Particularly, the peripheral vision in the dynamic visual environment (i.e., dynamic peripheral vision) is crucial (e.g., driving, walking, playing, etc.). For example, drivers need good peripheral vision since the driving safety depends strongly on the detection ability of moving cars and other objects in the peripheral visual field, as well as the ability to react to these visual stimuli in a timely manner (Hu et al., 2014). Team sports practitioners need high peripheral visual ability to sense the sports environment, as the peripheral vision facilitates motion detection (Knudson and Kluka, 1997) and its reaction time is faster than that of saccadic vision. Moreover, good peripheral vision is beneficial for either monitoring surroundings or maintaining steady balance in team sports. For instance, when a player wants to pass the soccer ball to his teammate, he should not look at his teammate directly and make a heel-dragging decision. Otherwise, he may lose the control of the ball as the defender would identify and prevent the passing through the detection of the opponent's eye gaze. Therefore, the player has to employ his peripheral vision to gather information from the sports environment and keep focused without revealing his intention so as to avoid defending actions by his opponents. If a player has better peripheral vision ability, he can notice his teammate earlier and make a better pass with a higher success rate.

In the literature, an increasing number of studies have demonstrated that the EEG alpha activity is closely linked to a

Journal of Experimental Psychology:
Human Perception and Performance
2006, Vol. 32, No. 6, 1465–1478

0096-1523/06/$12.00 DOI: 10.1037/0096-1523.32.6.1465

Effect of Action Video Games on the Spatial Distribution of Visuospatial Attention

C. Shawn Green and Daphne Bavelier
University of Rochester

The authors investigated the effect of action gaming on the spatial distribution of attention. The authors used the flanker compatibility effect to separately assess center and peripheral attentional resources in gamers versus nongamers. Gamers exhibited an enhancement in attentional resources compared with nongamers, not only in the periphery but also in central vision. The authors then used a target localization task to unambiguously establish that gaming enhances the spatial distribution of visual attention over a wide field of view. Gamers were more accurate than nongamers at all eccentricities tested, and the advantage held even when a concurrent center task was added, ruling out a trade-off between central and peripheral attention. By establishing the causal role of gaming through training studies, the authors demonstrate that action gaming enhances visuospatial attention throughout the visual field.

Keywords: video games, attention, useful field of view

Visual acuity, or the ability to discriminate small changes in shape in central vision, is a key determinant of vision. Ask someone how good their vision is, and they will typically comment on their ability to read a sign, to recognize faces from afar, or to score 20/20 on an optometrist's eye chart. However, many of the visual tasks people complete on a day-to-day basis bear little relation to the ability to read the bottom line on an eye chart. For instance, driving does not require perfect acuity (many U.S. states require that one's vision be only 20/40 to receive a driver's license). Instead, the most common visual demands present while driving involve focusing attention on relevant stimuli, such as pedestrians, animals, and other cars, while ignoring the many irrelevant distractors that clutter the visual environment. The dichotomy between visual acuity and visual attention has been exemplified by many studies (Ball, Beard, Roenker, Miller, & Griggs, 1988; Ball & Owsley, 1991; Ball, Owsley, & Beard, 1990; Ball, Owsley, Sloane, Roenker, & Bruni, 1993; Intriligator & Cavanagh, 2001; Owsley & Ball, 1993; Owsley, Ball, & Keeton, 1995; Sekuler & Ball, 1986), with the general finding being that simple tests of visual acuity and perimetry are poor predictors of performance on tasks that demand effective visuospatial attention.

A number of paradigms have been developed with the goal of quantitatively measuring visual selective attention (Carrasco & Yeshurun, 1998; Eckstein, Pham, & Shimozaki, 2004; Eriksen & Eriksen, 1974; Lavie & Cox, 1997; Treisman & Gelade, 1980). In many of these paradigms, targets are presented simultaneously with distracting objects, and the influence of the distracting information on target processing is measured. Groups thought to have diminished attentional abilities, such as the elderly (Ball et al., 1988; Madden & Langley, 2003; Maylor & Lavie, 1998; Plude & Hoyer, 1986; Scialfa, Esau, & Joffe, 1998) and young children (Akhtar & Enns, 1989; Enns & Cameron, 1987; Enns & Girgus, 1985; Plude, Enns, & Brodeur, 1994; Rueda et al., 2004), typically demonstrate larger effects of distracting information on attentional tasks than normal adult controls, indicating an effect of age on the determinants of visual selective attention. Similarly, a host of data indicate that the control of visual selective attention decreases in most pathological populations, including frontal patients (Husain & Kennard, 1997), Alzheimer's patients (Levinoff, Li, Murtha, & Chertkow, 2004; Tales, Haworth, Nelson, Snowden, & Wilcock, 2005; Tales, Muir, Jones, Bayer, & Snowden, 2004), children with attention-deficit/hyperactivity disorder (Shalev & Tsal, 2003), and neglect patients (Russell, Malhotra, & Husain, 2004; Sprenger, Kompf, & Heide, 2002; Vivas, Humphreys, & Fuentes, 2003). Whereas most of the studies describing changes in visual selective attention document a decrease in performance as compared with normal healthy young adults, of interest to us was the possibility that this type of selective attention may be enhanced (rather than reduced) from the level typically observed in young adults.

Several researchers have noted enhancements in various aspects of visual attention as a result of video-game play (Castel, Pratt, & Drummond, 2005; Gopher, 1992; Gopher, Weil, & Bareket, 1994; Green & Bavelier, 2003; Greenfield, DeWinstanley, Kilpatrick, & Kaye, 1994; Trick, Jaspers-Fayer, & Sethi, 2005). Many of today's action video games are remarkably visually challenging. They regularly have unnaturally stringent attentional requirements, much more so than any everyday situation to which one may be exposed. For instance, in many video games, multiple items must be processed simultaneously, a task that would benefit from additional attentional resources across space. Additionally, many

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This research was supported by National Institutes of Health Grant EY 016880 and grants from the Office of Naval Research and the James S. McDonnell–Pew Foundation, all awarded to Daphne Bavelier. We thank Tony Monacelli, Dave McColgin, and Julie Cohen for help with data acquisition.

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Original research papers

VISUAL PERCEPTION AND ITS EFFECT ON REACTION TIME AND TIME-MOVEMENT ANTICIPATION IN ELITE FEMALE BASKETBALL PLAYERS

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Abstract

Introduction. The efficient collection and analysis of information from both the central and the peripheral field of vision may affect human coordination motor abilities. An analysis of the literature on the subject suggests that coordination motor abilities interact with one another, and it is only their combined effect that allows athletes to achieve technical mastery. The main aim of the study was to assess specific coordination motor abilities and to determine how visual perception and reaction time correlate with time-movement anticipation in elite female basketball players. ***Material and methods***. The study participants comprised 17 female basketball players from the Polish National Team aged 18.1 ± 0.8 years. The study involved three ability tests from the Vienna Test System: the Reaction Test (RT, S1), the Peripheral Perception test (PP), and the Time/Movement Anticipation test (ZBA, S2). ***Results***. The analysis of the results obtained proves that the best-developed ability in participants is reaction time, while the other abilities show average development. Study participants were able to develop their response abilities to such high levels by means of practice. A correlation coefficient was found between motor time and tracking deviation (r=0.56), and between time anticipation and the number of correct responses to stimuli appearing in the left (r=0.92) and right (r=0.88) field of vision. Athletes who achieved better results in time anticipation omitted fewer visual stimuli (r=0.7) in the peripheral field of vision. Statistically significant correlations were observed between movement anticipation and reaction time to stimuli in the central field of vision (r=0.58). ***Conclusions***. Perception abilities have a significant effect on time anticipation. The range of one's field of vision does not determine the reaction time to a visual stimulus. Perception efficiency and divided attention, in conjunction with time and movement anticipation, create a complex of specific psychomotor abilities that is indispensable for achieving success in team sports.

Key words: visual perception, coordination motor abilities, Vienna Test System, reaction time, time-movement anticipation, peripheral perception

Introduction

Achieving top results in sports is, without question, related to a high level of cognitive, perception, motor, and physical abilities. Compared to any other activity, sports competition sets extremely strict requirements for the functioning of the visual system [1].

The visual system is the most complex sensory system which is engaged in creating feedback and dominates the other sensory systems. Good sight requires extraordinary visual and perceptual abilities that involve providing information to the brain via the eyes. The brain interprets this information and initiates appropriate physical actions [2, 3]. The sense of sight gathers as much as 80% to 90% of all human sensory information, which is why researchers increasingly consider the importance of visual perception as a factor that influences the performance of athletes in sports. The efficient collection and analysis of data concerning both the central and the peripheral fields of vision can influence the coordination motor abilities (CMA) of athletes [4].

Visual perception is the ability to recognize and interpret visual stimuli in the context of previous experiences, although it is a process of creation rather than re-creation. It is an element of almost all human actions and is assessed through reaction time to a stimulus appearing in the central or peripheral field of vision [5].

Elite sports require that athletes show the highest possible level of reaction to stimuli in both the central and peripheral (left and right) fields of vision, because selecting key information about the opponent's movements is only efficient if the athlete observes the opponent's entire body and its surroundings [2, 4].

The first scholar to notice and describe a relationship between visual perception, the human body, and the ball was Galen (in the second century BCE). His findings motivated other authors to conduct further research on the correlation between visual perception and success in sports [6]. Today, we know that elite athletes have better visual skills and a higher level of coordination motor abilities (CMA) than persons not engaged in sports [7]. Visual perception may directly affect CMA by en-

THE IMPACT OF VISION AND VISION TRAINING ON SPORT PERFORMANCE

Duane Knudson, Ph.D., Baylor University
and
Darlene A. Kluka, Ph.D., University of Central Oklahoma

Summary. It is important for teachers and coaches of motor skills to utilize safety procedures and protective equipment in supervising sports with a risk of eye injury. Teachers and coaches should also be aware of how vision affects instruction and performance, and the growing body of sport vision research. Interested readers are referred to several sources (Abernethy, 1986; Blundell, 1985; Fiske, 1993; McNaughton, 1986; Sherman, 1980). Coaches and athletes must understand that the visual demands of most sports can result in visual errors by officials and performers. Knowledge of the limits of the visual system will help the movement professional plan appropriate instruction and feedback.

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Visual acuity, or the ability to discriminate small changes in shape in central vision, is a key determinant of vision. Ask someone how good their vision is, and they will typically comment on their ability to read a sign, to recognize faces from afar, or to score 20/20 on an optometrist's eye chart. However, many of the visual tasks people complete on a day-to-day basis bear little relation to the ability to read the bottom line on an eye chart. For instance, driving does not require perfect acuity (many U.S. states require that one's vision be only 20/40 to receive a driver's license). Instead, the most common visual demands present while driving involve focusing attention on relevant stimuli, such as pedestrians, animals, and other cars, while ignoring the many irrelevant distractors that clutter the visual environment. The dichotomy between visual acuity and visual attention has been exemplified by many studies (Ball, Beard, Roenker, Miller, & Griggs, 1988; Ball & Owsley, 1991; Ball, Owsley, & Beard, 1990; Ball, Owsley, Sloane, Roenker, & Bruni, 1993; Intriligator & Cavanagh, 2001; Owsley & Ball, 1993; Owsley, Ball, & Keeton, 1995; Sekuler & Ball, 1986), with the general finding being that simple tests of visual acuity and perimetry are poor predictors of performance on tasks that demand effective visuospatial attention.

A number of paradigms have been developed with the goal of quantitatively measuring visual selective attention (Carrasco & Yeshurun, 1998; Eckstein, Pham, & Shimozaki, 2004; Eriksen & Eriksen, 1974; Lavie & Cox, 1997; Treisman & Gelade, 1980). In many of these paradigms, targets are presented simultaneously with distracting objects, and the influence of the distracting information on target processing is measured. Groups thought to have diminished attentional abilities, such as the elderly (Ball et al., 1988; Madden & Langley, 2003; Maylor & Lavie, 1998; Plude & Hoyer, 1986; Scialfa, Esau, & Joffe, 1998) and young children (Akhtar & Enns, 1989; Enns & Cameron, 1987; Enns & Girgus, 1985; Plude, Enns, & Brodeur, 1994; Rueda et al., 2004), typically demonstrate larger effects of distracting information on attentional tasks than normal adult controls, indicating an effect of age on the determinants of visual selective attention. Similarly, a host of data indicate that the control of visual selective attention decreases in most pathological populations, including frontal patients (Husain & Kennard, 1997), Alzheimer's patients (Levinoff, Li, Murtha, & Chertkow, 2004; Tales, Haworth, Nelson, Snowden, & Wilcock, 2005; Tales, Muir, Jones, Bayer, & Snowden, 2004), children with attention-deficit/hyperactivity disorder (Shalev & Tsal, 2003), and neglect patients (Russell, Malhotra, & Husain, 2004; Sprenger, Kompf, & Heide, 2002; Vivas, Humphreys, & Fuentes, 2003). Whereas most of the studies describing changes in visual selective attention document a decrease in performance as compared with normal healthy young adults, of interest to us was the possibility that this type of selective attention may be enhanced (rather than reduced) from the level typically observed in young adults.

Several researchers have noted enhancements in various aspects of visual attention as a result of video-game play (Castel, Pratt, & Drummond, 2005; Gopher, 1992; Gopher, Weil, & Bareket, 1994; Green & Bavelier, 2003; Greenfield, DeWinstanley, Kilpatrick, & Kaye, 1994; Trick, Jaspers-Fayer, & Sethi, 2005). Many of today's action video games are remarkably visually challenging. They regularly have unnaturally stringent attentional requirements, much more so than any everyday situation to which one may be exposed. For instance, in many video games, multiple items must be processed simultaneously, a task that would benefit from additional attentional resources across space. Additionally, many

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This research was supported by National Institutes of Health Grant EY 016880 and grants from the Office of Naval Research and the James S. McDonnell–Pew Foundation, all awarded to Daphne Bavelier. We thank Tony Monacelli, Dave McColgin, and Julie Cohen for help with data acquisition.

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Journal of Human Kinetics volume 46/2015, 231-240 DOI: 10.1515/hukin-2015-0051
Section IV – Behavioural Sciences in Sport

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The Efficiency of a Visual Skills Training Program on Visual Search Performance

by
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In this study, we conducted an experiment in which we analyzed the possibilities to develop visual skills by specifically targeted training of visual search. The aim of our study was to investigate whether, for how long and to what extent a training program for visual functions could improve visual search. The study involved 24 healthy students from the Szczecin University who were divided into two groups: experimental (12) and control (12). In addition to regular sports and recreational activities of the curriculum, the subjects of the experimental group also participated in 8-week long training with visual functions, 3 times a week for 45 min. The Signal Test of the Vienna Test System was performed four times: before entering the study, after first 4 weeks of the experiment, immediately after its completion and 4 weeks after the study terminated. The results of this experiment proved that an 8-week long perceptual training program significantly differentiated the plot of visual detecting time. For the visual detecting time changes, the first factor, Group, was significant as a main effect ($F(1,22)=6.49$, $p<0.05$) as well as the second factor, Training ($F(3,66)=5.06$, $p<0.01$). The interaction between the two factors (Group vs. Training) of perceptual training was $F(3,66)=6.82$ ($p<0.001$). Similarly, for the number of correct reactions, there was a main effect of a Group factor ($F(1,22)=23.40$, $p<0.001$), a main effect of a Training factor ($F(3,66)=11.60$, $p<0.001$) and a significant interaction between factors (Group vs. Training) ($F(3,66)=10.33$, $p<0.001$). Our study suggests that 8-week training of visual functions can improve visual search performance.

Key words: *sports vision, training, eye movements.*

Introduction

One of the essential components of the perceptual mechanism in visual information processing is the ability to effectively search in order to locate a specific object among many others. This process of visual search is based on oculomotor functions, e.g. pursuit eye movements, saccadic eye movements, and steadiness of fixation. The ability to initiate a pursuit eye movement to maintain fixation of a moving object, as well as the ability to initiate an accurate saccadic eye movement for direct fixation from one object to another, are essential aspects in many daily activities (Land and Hayhoe, 2001). With regard to motor behavior, it has been indicated that the visual search ability is a factor determining the effectiveness of professional work undertaken by specialists from diverse backgrounds, e.g. drivers (Chapman et al., 2002) or beach lifeguards (Page et al., 2011).

When considering athletic performance, the efficiency of a visual search strategy is particularly important, both in individual and team sports, and among athletes of different disciplines, for example in squash (Abernethy,

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Authors submitted their contribution to the article to the editorial board.
Accepted for printing in the Journal of Human Kinetics vol. 46/2015 in June 2015.

Journal of Sports Sciences

ISSN: 0264-0414 (Print) 1466-447X (Online) Journal homepage: http://www.tandfonline.com/loi/rjsp20

Perceptual skill in soccer: Implications for talent identification and development

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To cite this article: A. M. Williams (2000) Perceptual skill in soccer: Implications for talent identification and development, Journal of Sports Sciences, 18:9, 737-750, DOI: 10.1080/02640410050120113

To link to this article: https://doi.org/10.1080/02640410050120113