STUDIA UBB EDUCATIO ARTIS GYMN., LXV, 4, 2020, pp. 91 – 96
(RECOMMENDED CITATION)
DOI:10.24193/subbeag.65(4).34

THE INFLUENCE OF PERCEIVED COLOURS OVER THE REACTION ACCURACY OF YOUTH TENNIS PLAYERS

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ABSTRACT. Introduction. Reaction is a purposeful voluntary response to an external stimulus. There is certain time period between application of external stimulus and appropriate motor response to the stimulus called the reaction time. **Objectives***.* The aim of this paper was to determine if different colour contrasts affects the reaction time of young tennis players. **Materials and Methods***.* The participants in this study were young tennis players (N = 10), 3 females and 7 males, with the ages between 12 to 13 years old. **Results.** There was a significant difference in the scores for white background (M=7.5, SD=1.51) and orange background (M=6, SD=0.81) conditions; t(9)=3.30, p = 0.009. **Conclusion.** Our study managed to show that a different kind of background colour can affect the reaction accuracy in identifying an object of different shape and colour than the background.

Keywords: *tennis, reaction accuracy, colours, visual, tapping*

REZUMAT. ***Influenţa culorilor percepute asupra acurateţii reacţiei la jucătorii tineri de tenis*****. Introducere.** Reacţia este un răspuns voluntar la un stimul exterior. Există un anumit timp între aplicarea stimulului şi un răspuns motor la acest stimul numit timp de reacţie. **Obiective**. Scopul acestei lucrări este de a vedea dacă contraste diferite de culori afectează timpul de reacţie la jucătorii tineri de tenis. **Material şi metode**. În acest studio au fost cuprinşi jucători tineri de tenis (N=10), 3 fete şi 7 băieţi cu vârste cuprinse între 12 şi 13 ani. **Rezultate**. Au fost diferenţe semnificative pentru culoarea alba (M=7.5, SD=1.51) şi culoarea portocalie (M=6, SD=0.81); t(9)=3.30, p=0.009. **Concluzii.** Studiul nostru a reuşit să arate că un fundal de culori diferite poate afecta acurateţea reacţiei în identificarea unui obiect de altă culoare decât fundalul.

Cuvinte cheie*: tenis, acurateţea reacţiei, culori, vizual, tapping*

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Introduction

Reaction is a purposeful voluntary response to an external stimulus. There is certain time period between application of external stimulus and appropriate motor response to the stimulus called the reaction time. Reaction time is defined as interval of time between presentation of stimulus and appearance of appropriate voluntary response in a subject (Batra et. al., 2014; Grrishma et. al. 2013). It is usually expressed in milliseconds. It reflects the speed of the flow of neurophysiological, cognitive, and information processes which are created by the action of stimulus on the person's sensory system. The receipt of information (visual or auditory), its processing, decision making, and giving the response or execution of the motor act are the processes which follow one another and make what we call the reaction time (Madan et. al., 1984; Malathi et. al., 1990; Baayen and Milin, 2010).

Many factors have been shown to affect reaction time including gender, age, physical fitness, level of fatigue, distraction, alcohol, personality type, limb used for test, biological rhythm, and health and whether the stimulus is auditory or visual (Baayen and Milin, 2010). Reaction time is independent of social-cultural influences. Prolonged reaction time denotes decreased performance (Shah et. al., 2010).

The choice reaction time can be studied by using visual inputs or by using auditory inputs. When studied using visual inputs it is called visual choice reaction time. Contemporary models of color vision assume that chromatic information is extracted through two independent postreceptoral cone-opponency channels, processing red-green (L-M) and blue-yellow (S-[L-M]) information (where S, M, and L represent input from short, middle, and long wavelength sensitive cones, resp.) (Lit et. al., 1971). Because of this, red, green, and yellow colors were used for the study. Reaction time is faster when the dominant hand is used when compared with the opposite side. Visual choice reaction time using the dominant limbs was studied. Reaction time is faster in men compared with women (Misra et. al., 1985).

Objectives

The aim of this paper was to determine if different color contrasts affects the reaction time of young tennis players.

Methods

Subjects

The participants in this study were young tennis players (N = 10), 3 females and 7 males, with the ages between 12 to 13 years old.

Methods and the Steps of the Research

For the purpose of this study four background colours were used: white, green, orange and gray. Over these colours, a yellow circle would appear a total number of 10 for each background. The time gap between the appearence of the yellow circle was randomize by the computer. The number of successful clicks for each appearence of the circle was quantified for each subject.

The background colours were chosen as follows: white – reference, green – the colour of a grass tennis field, orange – the colour of a slag tennis field, and gray – the colour of a concrete tennis field.

Results

After the tests were finished we've collected the following data for each subject and for each background tested.

Table 1. Successful clicks of each subject for each background tested

Subject	White_Board	Green_Board	Orange_Board	Gray_Board
1	7	8	5	6
2	6	7	6	7
3	8	8	5	6
4	9	8	7	6
5	9	9	6	8
6	9	8	6	6
7	6	9	5	8
8	7	9	7	7
9	5	7	6	7
10	9	9	7	7

A paired-samples t-test was conducted to compare successful clicks on white and green background. There was a significant difference in the scores for white background (M=7.5, SD=1.51) and green background (M=8.2, SD=0.79) conditions; t(9)=-1.65, p = 0.132. This means that the white and green colour have no influence over the reaction accuracy of the subjects regarding the yellow circle.

A paired-samples t-test was conducted to compare successful clicks on white and orange background. There was a significant difference in the scores for white background (M=7.5, SD=1.51) and orange background (M=6, SD=0.81) conditions; t(9)=3.30, p = 0.009. This means that the change from white to orange colour has a major influence over the reaction accuracy of the subjects regarding the yellow circle. The successful clicks decrease when the orange background is used.

A paired-samples t-test was conducted to compare successful clicks on white and grey background. There was a significant difference in the scores for white background (M=7.5, SD=1.51) and grey background (M=6.8, SD=0.78) conditions; t(9)=1.17, p = 0.271. This means that the white and gray colour have no influence over the reaction accuracy of the subjects regarding the yellow circle.

Table 2. Mean, Standard deviation and standard error mean calculated for each pair of backgrounds

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	White_Board	7.5000	10	1.50923	.47726
	Green_Board	8.2000	10	.78881	.24944
Pair 2	White_Board	7.5000	10	1.50923	.47726
	Orange_Board	6.0000	10	.81650	.25820
Pair 3	White_Board	7.5000	10	1.50923	.47726
	Gray_Board	6.8000	10	.78881	.24944

Table 3. Paired sample t-test for each pair of backgrounds

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	White_Board - Green_Board	-.70000	1.33749	.42295	-1.655	9	.132
Pair 2	White_Board - Orange_Board	1.50000	1.43372	.45338	3.308	9	.009
Pair 3	White_Board - Gray_Board	.70000	1.88856	.59722	1.172	9	.271

Conclusion

Our study managed to show that a different kind of background colour can affect the reaction accuracy in identifying an object of different shape and colour than the background.

These results may point towards the idea that tennis players must train their reaction accuracy according to the type coloured field they will play on. The fact that the orange background drastically reduces the accuracy of the young tennis players shows that slag fields may lower their performance during play.

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