PSYCHOLOGICAL EXPERIMENT FOR MEASURING REACTING VELOCITY BY VOLLEYBALL DESIGN

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ABSTRACT

It appears that the movements of volleyball in various colors give us different images when they move quickly or slowly. While watching volleyball games, people have impression that boll design might take some significance effect toward game. Actually, volleyball athletes sometimes report that red/black ball seems heavier than other bolls. This study intends to estimate what and/or how effect might be taken by different of volleyball design.

First trial is measuring reacting velocity of detecting boll spinning direction. This experiment shows difference between each ball design, but accuracy rate data of this experiment shows interaction of ball design and boll fling speed. Second trial is measuring time gap between bolls falling down speed and observer's recognition speed. By this experiment, we expected to find out statistically significant difference by ball design or color combination, but it indicates there is difference between experimental groups.

INTRODUCTION

Japan Volleyball Association (JVA) is the National Body for the sport of volleyball in the Japan and is recognized as such by the Federation International de Volleyball (FIVB). JVA have an activity for giving official approval to ball for volleyball. In past day, it was always white. In today, it becoming various designed and colored as shown in Figure 1.

Blue/yellow and white Red and black Yellow and blue

Figure 1. Ball Example

All of these balls are actually used in official games. I don't know report that study how felt these balls by people. In other hands, simple impression by members in Kanagawa University Volleyball team is it makes effective to playing performance. Then we try to measuring performance affectivities by ball design.

METHOD

Basic approach is measuring reaction time by simulation software on PC. Simulation software shows volleyball images to screen and subject respond spin direction (TEST1) or tap on time when ball touch down (TEST2). Screen image is shown as Figure 2. Ball images are made by take photo

by actual volleyball. In this study, reaction time for spin direction recognizing and ball touch down time, are picked up. Because, spin direction of ball, is important for forecasting ball's locus at next moment. Time gap for ball touch down is important for preparing ball receiving.

Figure 2. Simulation Screen Image

TEST1:

April 29, 2009. 15 people of Volleyball team member of Kanagawa University. Subject mission is response when they recognizing spin direction. Tester measure a reaction time of it. Parameter is ball (Blue/yellow and white, Red and black, Yellow and blue like Figure 1), flying speed and spin speed.

Table 1: Statictics of Reaction Time (Average)

ball	Blue/yellow and white, Red and black, Yellow and blue
	712.42, 743.32, 986.85
	F(2,33)=17.11,p<.001
flying speed	2,4
	731.16, 678.06
	F(1,33)=.070,n.s.
spin speed	2,4,8
	812.48, 674.54, 607.52
	F(2,66)=.060,n.s.

TEST2:

April 2, 2010. 12 people of Volleyball team member of Kanagawa University. Subject mission is push bar on PC's keyboard when they recognize volleyball is touch downed. Tester measure a time gap from correct touch down time. Parameter is ball and flying speed.

Table 2: Statictics of Reaction Time (Average of estimation gap)

ball	Blue/yellow and white, Red and black, Yellow and blue
	14160.31, 9067.027, 11261.67
	F(2,6)=5.14,n.s.
flying speed	4, 5, 6, 7
	25545.06, 8697.60, 7515.65, 4227.05
	F(3,6)=4.76,p<.001

RESULT AND DISCUSSION

Test data include a lot of number of record. The actual number of record is 5584 for TEST1, and 3030 for TEST2. Use this kind of huge number of record, it easy to get result of "Significantly Different" by small difference. Figure 3 shows averages by ball design at TEST1. Just focusing these averages and takes single dimension ANOVA, then it is actually "Significantly Different". But this is undesirable. It seems to more discreetly attitude is required, because another factor like spinning or flying speed is more effective than ball design.

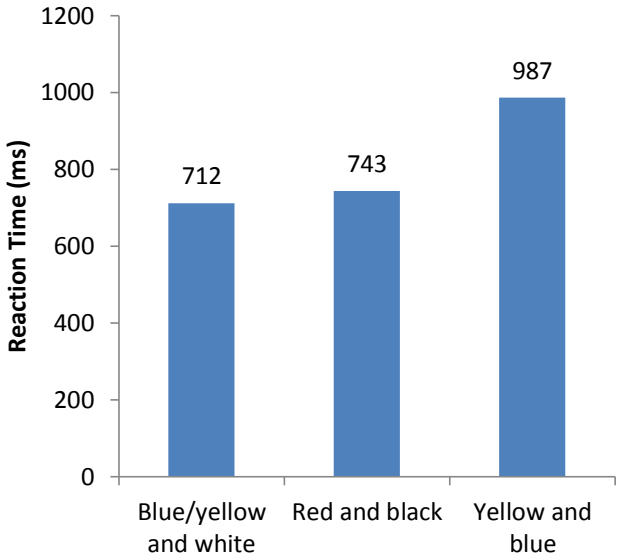

Figure 3. Averaged Reaction Time for Spin Direction

In TEST1, possible parameter is ball design, spin speed and ball flying speed, and takes ANOVA with these three parameters (Table 1). In TEST2, possible parameter is ball design and ball flying speed, and takes ANOVA with these two parameters (Table 2). By result TEST1 ANOVA, it still affective ball design and spin/flying speed is not. But ball design is not affective in TEST2 ANOVA.

These result of statistics analyze possibly indicates that ball design is affective to some visual recognition of volleyball player, but it is not always observed.

In other hand, difference by player is interested by some reason. Because ball design is not sure for game performance for many people, but everybody knows that player is sure about game performance.

By the result of test data, I think spinning recognizing is affected by ball design and not strongly affected by player. But ball touch down forecasting is more significant in point of view "player". Figure 4 shows time gap for ball touch down forecast testing (TEST2).

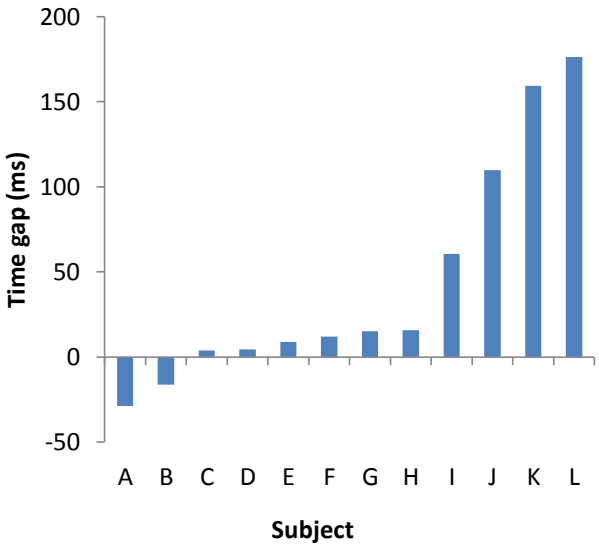

Figure 4. Averaged Time Gap for Ball Touch Down

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