

## **"Yellow or White?" A Preliminary Investigation into the Effects of Ball Colours on the Players Speed of Response in International Table Tennis**

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### **Introduction**

Over the past twenty years international table tennis has developed into a fast ball game, which requires rapid responses by today's elite players. These players have to determine the ball's line of flight speed and spin in a split second and the earlier the ball can be perceived by these players, the more time they will have to get in to position to play a shot.

Previous research in to the players response to a ball has indicated that anticipation has played an important part in aiding players in fast ball games (1,4). However, anticipation by an opponents arm movements cannot be wholly responsible for explaining the ability of the performer in fast ball games (we all know, for example, that playing in a white room with a white ball can sometimes hinder our performance as we have difficulty seeing the ball). Perception of the ball therefore, must also play a crucial role in the successful execution of a shot. Indeed the research in to anticipation cited above has shown that anticipation is more accurate when the player has more time to view the ball.

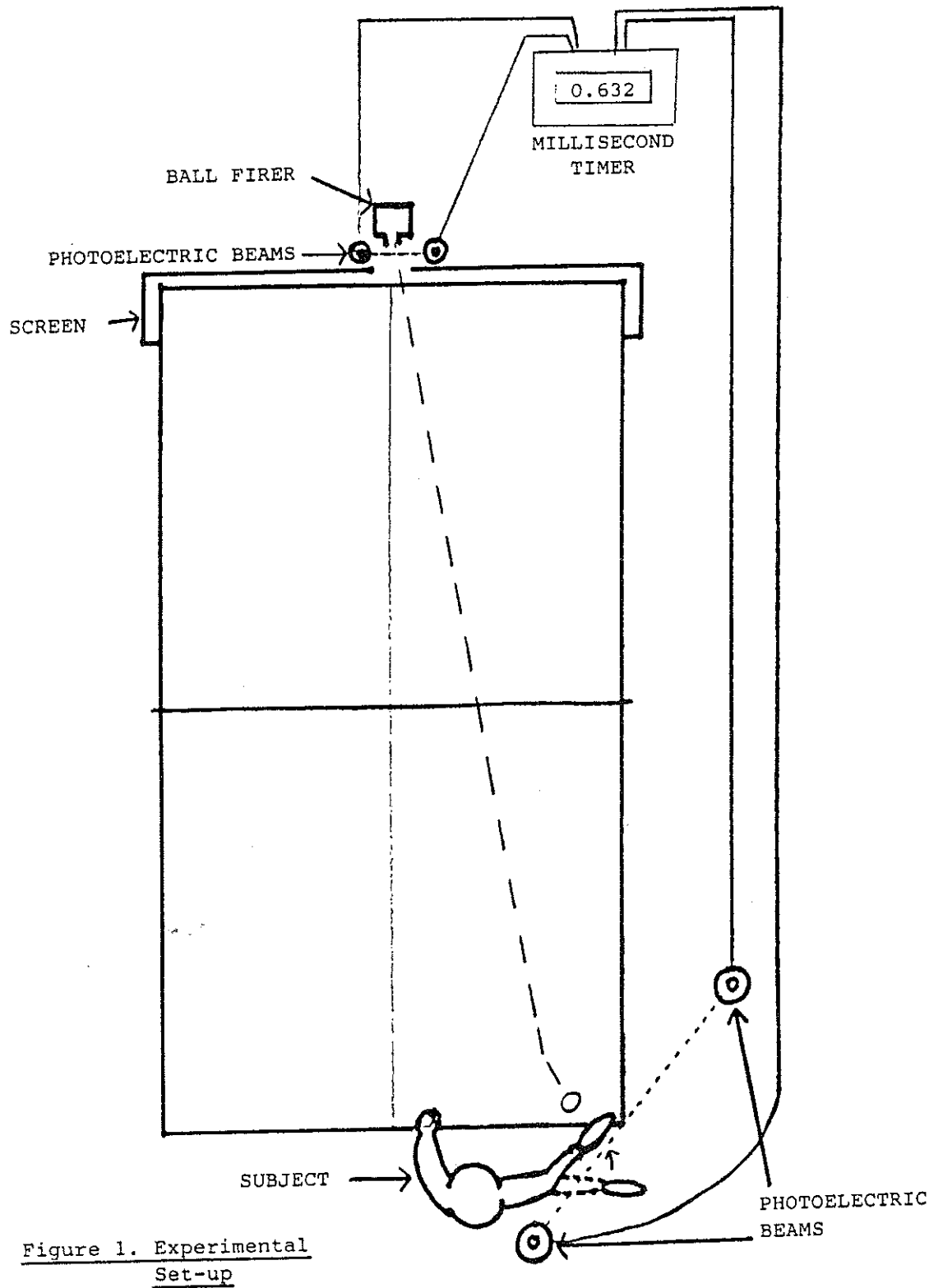
According to signal detection theory (7), perception of the ball will depend on the strength of the stimulus (in this case the ball) against the background. The greater the contrast in colour, the quicker the perception. Normally, international table tennis is played using a white ball and backgrounds are usually comprised of crowds, sponsorship colours or simply a blank wall. However, the International Table Tennis Federation recently sanctioned the introduction of a yellow ball for competitions, in particular the 1992 Olympics.

With this in mind, a study was undertaken to examine whether a white or yellow ball produced the shorter response time for international players. An extension to the study examined the interaction effect between ball and background colour. The background colours selected were the 'traditional' green, the blue of the most recent sponsors of the English Table Tennis Association and the red used in the 1989 world Tennis Championship in Dortmund.

The present literature provided little help in a table tennis setting so a preliminary investigation in relation to table tennis was undertaken.

### **Methods**

Seven elite English table tennis players (mean age = 21, S.D. = 4.7) took part in the experiment. Each subject stood in the normal ready position as if waiting for an opponents return (See figure 1). Table tennis balls were fired from the opposite end of the table by a Donic table tennis robot. The robot was placed behind a coloured screen



(either red, blue or green) which acted as the background. Each ball was fired through a small hole (20cmx30cm) in the screen. As soon as the ball was fired it broke a light beam thus starting a photoelectric timing device. At this point the ball had just entered the players visual field. The subject then had to play a normal forehand or backhand return, but only forehand responses were measured in the experiment.

A second light beam was located to the side and slightly behind the subject. Each time the subject played a forehand, his backswing would break the light beam, thus stopping the timing device. During practice trials it was noted that each players backswing differed according to his playing style, so the second light beam was adjusted for each player.

Each subject had ten practice trials. The experiment consisted of fifteen trials in each of the six combinations of ball and background colours. The order of presentation of colour combination was randomised as were foreperiods.

## Results

Mean response times for each combination of ball colour and background colour were calculated (see table 1). A two way ANOVA with two repeated measures demonstrated a highly significant ( $p < 0.005$ ) overall effect for ball colour, with the yellow ball producing a faster mean response time than the white. No significant effect was found for any of the background colours or the interaction of ball and background colours.

Table 1. Mean Response Times (msecs) for Various Ball and Background Colours

BALL COLOUR	BACKGROUND COLOUR		
	BLUE	RED	GREEN
White	607.4	634.6	625.1
Yellow	604.3	600.4	599.9

## Discussion

The results of this investigation are similar to other research projects in this area (3,6,9) which suggest that the contrast between ball and background is an important factor of visual perception. Previous research (6) has suggested that the yellow ball is the best colour to use against a variety of backgrounds and this study seems to support this notion. The results indicate that in elite table tennis where backgrounds are blue, green or red, players would benefit more if they played with a yellow ball.

Such results could have implications for the future of table tennis as the longer viewing time made available to players via the use of a yellow ball will give the player more time to initiate a stroke. As table tennis at international level is characterised by fast detection and initiation of strokes, the exciting reactions of top class players could be made even more pronounced through the use of the yellow ball.

The results could also have implications for coaching in the future, especially for beginners. One prominent feature of the beginner is that they need more time to prepare for a shot. By improving the perceptual conditions through the use of the yellow ball, the beginner may then have more time to concentrate on all coaching instructions. The data could also presumably be transferred to benefit spectators and television audiences

who would be able to follow play easier.

If further research indicates that the yellow ball produces faster responses against all backgrounds, it may be beneficial to introduce a yellow ball at local league levels, where many of the playing conditions are characterised by different coloured backgrounds.

To establish the optima; ball and background combination (or ball colour) for table tennis, further research is required to examine a greater variety of combinations. However, evidence for the use of the yellow ball in international table tennis has emerged in this investigation even though it is merely a preliminary study.

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