Current Psychological Research (1982), **2**, 95–100

Differential Effects of Red and Blue Coloured Lighting on Gambling Behaviour

G. M. STARK[a], D. M. SAUNDERS[b] & P. E. WOOKEY[a]

[a]*Plymouth Polytechnic*

[b]*Polytechnic of Wales*

Gambling at a modified version of three-card brag was observed for 28 volunteers, subjected to red or blue light conditions. It is concluded that subjects within a red light environment gambled more money more often and selected riskier odds than did subjects gambling under blue light. Furthermore, riskier bets were generally associated with later trials and red light again enhanced such an effect as compared with blue light. The results are discussed in terms of psychoanalytical theory, psychophysiology and choice shifts within group situations for various gambling activities.

INTRODUCTION

The variable of coloured lighting has affected a number of behavioural patterns exhibited within a variety of contexts that range from physiological and medical through to aesthetic and advertisement (see Birren, 1978, for a comprehensive review). With reference to physiological research, colour has consistently affected GSR and electroencephalogram readings associated with the orienting response (Dodd & Lewis, 1969) and neural responses in the ganglia (Granit, 1943). As Bornstein (1978) concludes, there can be little doubt about the directness of the relationship between colour stimulation and central nervous system activity, although why this should be the case remains more mysterious. With reference to observed behaviour, red appears to be associated with increased frequency and intensity of responding as compared with green or blue, whilst red and blue are usually preferred to yellow and green (Eysenck, 1941; Goethe, 1971). To date few investigations have attempted to observe the differential effects of colour stimulation on more complex behaviour occurring within realistic situations. In this paper one frequent and sophisticated behaviour, gambling, is recorded within the context of two coloured lightings, red and blue. If red really is so arousing then subjects exposed to red light are

0144–3887/82/0202–95 $02.00

likely to gamble more frequently, stake more money, and take greater risks than will subjects exposed to blue light.

DESIGN

Subjects

The subjects were 28 male or female Polytechnic students, aged 18 to 22, and volunteers. None was colour blind or was a regular gambler. All were initially asked whether they would like to participate in a card game at which they might win some money.

Apparatus

Apparatus consisted of: 120 red and 120 white casino chips, 14 packs of playing cards, six labels numbered one to six, six corresponding labels marked with different odds (1/1, 2/1, 3/1, 4/1, 5/1, 6/1), six cards denoting the maximum stake allowed on each odds (80p, 40p, 25p, 20p, 15p and 8p respectively), a set of scoring sheets and pens (one per subject), list of details of order of winning hands (one per subject), red and blue fluorescent lights matched for brightness, two large tables placed together around which were placed seven chairs, and one small table placed opposite at which the experimenter positioned himself together with chips and cards.

Procedure

Subjects were given 90p worth of chips (15 x 5p red; 15 x 1p white) and then completed 20 trials (without knowing that the 20th trial was to be the last one) of a variation of three-card brag. In the normal version of this game each player is dealt three cards and, after betting as in poker, the highest hand wins. In the experimental version six exposed hands, labelled one to six, were each dealt two cards with each pair being associated with particular odds and a maximum stake (see Figure 1). Subjects were told that the cards came from 14 shuffled packs and that there was therefore no positive way of predicting which cards would appear on the third deal. They were also told that the first two cards for each hand had been prearranged by the experimenter to provide approximately the correct odds. Unknown to the subjects, the third card for each hand had also been rigged in order to provide identical results for the two experimental conditions: gambling in blue light (14 subjects) and gambling in red light (14 subjects).

Actual winning hands were allocated as follows: hand number 1, six wins (1/1); number 2, five wins (2/1); number 3, four wins (3/1); number 4, three wins (4/1); number 5, two wins (5/1); number 6, one win (6/1). All bets were placed before the third card was dealt and subjects could place bets on as many selections as they wished with a minimum of one bet per trial. All subjects were further informed that they would receive, in cash, the value of any excess over 50p worth of chips accumulated at the end of the experiment. Seven subjects were seated around the tables for each session and there were therefore two groups for each colour

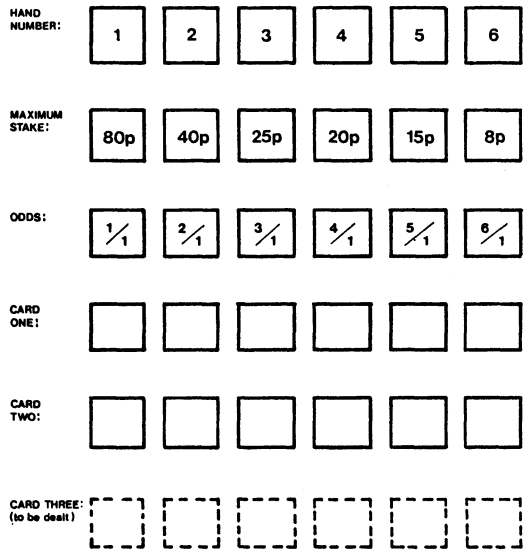

Figure 1. Layout of cards designating number of hand, odds and maximum bet.

condition. At the end of the experiment all subjects were informed of the predetermined order of cards and the purpose of the study.

RESULTS

Significantly more money was invested and more bets placed in the red as opposed to the blue colour conditions ($F = 8.985$, d.f. = 1, 26, $P \leqslant 0.01$ for amount of money invested; $F = 11.382$, d.f. = 1, 26, $P \leqslant 0.01$ for frequency of bets). Table 1 provides more detailed information about the size of wagers for the various odds.

TABLE 1. Average amount of money (expressed in pence) bet over trials for type of odds within each colour condition

	1/1	2/1	3/1	4/1	5/1	6/1	Overall
Blue	2.27	2.83	2.53	2.32	2.22	1.88	2.38
Red	3.92	3.28	3.39	2.94	2.90	2.20	3.08
Overall	3.12	3.10	3.01	2.71	2.60	2.11	2.80

Significant results were also obtained for trial x odds x colour interactions on both amount of money invested ($F = 1.556$, d.f. = 95, 2470, $P \leqslant 0.01$) and number of bets placed ($F = 1.631$, d.f. = 95, 2470, $P \leqslant 0.01$). This implies that as the experiment progressed subjects gambled more money, increased the frequency of their gambling, took greater risks, and that these behaviours were most pronounced for the red light condition.

DISCUSSION

There can be no doubt of the importance of the colour variable within a gambling environment. Red light tends to have less of an inhibitory effect on amount and frequency of money staked and riskiness of selected bet. The problem now is to provide a suitable psychological explanation for such data. Psychoanalytical theory, for example, suggests that reactions to colours can be determined by early experience, so that particular colours adopt symbolic representation. Redness thus implies primeval sexual force and oral gratification as when the nipple is offered to the baby (Freud, 1953), which presumably leads to the meaning of desire and hedonistic gratification. Unfortunately, it appears difficult empirically to verify such a suspicion although the quasi-psychoanalytical Luscher colour test (1949, reviewed by Scott, 1970) has claimed a strong relationship between colour preference and personality.

A more credible and testable explanation could involve a semiological approach that stresses the cultural significance of the different colours for participants. Another contrasting, though not necessarily contradictory, suggestion concerns the possibility of a higher cortical arousal level to red colour and a subsequent assumed increase in overt behaviour (Kahneman, 1973). As applied to the present study such overt behaviour would presumably be reflected in increased persistence and involvement within card playing.

Much interest has been expressed in the tendency for gamblers to take greater risks as increased experience is accumulated (Blascovich et al, 1975a): a tendency that has been observed in the present study. With collective betting group polarization or group choice shifts, whether to caution (in, for example horseracing as observed by McCauley et al, 1973, and Knox & Safford, 1976) or risk (with, for example, blackjack as observed by Pruitt and Teger, 1969, and Blascovich et al, 1975b) are further reported. Although the difference in findings among various studies have been attributed to methodological biases by some authors (Sanders, 1978; Felsenthal, 1979), there remains the intriguing possibility of each type of gambling being affected by exclusive environmental conditions other than the actual gambled-upon-event itself.

REFERENCES

Birren, F. (1978). Colour and Human Response. New York: Van Nostrand.

Blascovich, J., Ginsberg, G.P. & Hove, R.C. (1975a). Blackjack and the risky shift, II: monetary stakes. Journal of Experimental and Social Psychology, 11, 224-232.

Blascovich, J., Ginsberg, G.P. & Veach, T.L. (1975b). A pluralistic explanation of choice shifts on the risk dimension. Journal of Personality and Social Psychology, 31, 422-429.

Bornstein, M.H. (1978). Colour vision and pattern vision. Advances in Child Development and Behaviour, 12, 117-182.

Dodd, C. & Lewis, M. (1969). The magnitude of the orienting response in children and function of changes in colour and contour. Journal of Experimental Child Psychology, 8, 296-305.

Eysenck, H.J. (1941). A critical and experimental study of colour preferences. American Journal of Psychology, 55, 385-394.

Felsenthal, D.S. (1979). Group versus individual gambling behaviour: re-examination and limitation. Behavioural Science, 24, 334-345.

Freud, S. (1953). The interpretation of dreams (part 2). In J. Strachey (ed.), The Standard Edition of the Complete Psychological Works of Sigmund Freud, Volume V.

Goethe, J.W. von (1971). Goethe's Colour Theory (edited by R. Matthaei, translated by H. Aach). London: Studio Vista.

Granit, R. (1943). A physiological theory of colour perception. In Teevan, R.C. & Birney, R.C. (eds.), Colour Vision (1961). New York: Van Nostrand.

Kahneman, D. (1973). Attention and Effort. New Jersey: Prentice Hall.

Knox, R.E. & Safford, R.K. (1976). Group caution at the race track. Journal of Experimental Social Psychology, 12, 317-324.

McCauley, C., Stitt, C.L., Woods, K. & Lipton, D. (1973). Group shift and caution at the race track. Journal of Experimental Social Psychology, 9, 80-86.

Pruitt, D.G. & Teger, A.I. (1969). The risky shift in group betting. Journal of Experimental Social Psychology, 5, 115-126.

Sanders, G.S. (1978). An integration of shifts towards risk and caution in gambling situations. Journal of Experimental Social Psychology, 14, 409-416.

Scott, I.A. (1970). The Luscher Colour Test. London: Pan.

D.M. SAUNDERS The Polytechnic of Wales, Pontypridd, Mid Glamorgan CF37 1DL.

Date of acceptance for publication: February 1982