$\bar{X} = 4.17$; $p < .05$, Duncan's test). No other main or interaction effects approached significance ($ps > .25$).

As a further check to determine whether a guessing effect might be present for both anticipation and recall conditions early in learning, an additional analysis was conducted on the total number of errors for Trials 2 and 3. (Once again the initial guessing or study trial data was excluded.) The results of the five-way analysis of variance with repeated measures for trials were similar to those for the transformed total errors to criterion. Significantly fewer errors were made by Ss under the recall procedure (raw score $\bar{X} = 3.69$) than by Ss under the anticipation procedure ($\bar{X} = 5.14$), $F(1,112) = 8.47$, $p < .01$. Males made significantly more errors ($\bar{X} = 5.33$) than did females ($\bar{X} = 3.50$), $F(1,112) = 13.40$, $p < .001$. A practice effect was also evident, as Ss made significantly more errors on Trial 2 ($\bar{X} = 2.74$) than on Trial 3 ($\bar{X} = 1.67$), $F(1,112) = 47.79$, $p < .001$. Once again there was a highly significant Method by Initial Trial Instruction interaction, $F(1,112) = 9.60$, $p < .005$. The cell means based on total raw error scores for the two trials combined were 6.25 (anticipation-guessing), 4.03 (anticipation-observing), 4.12 (recall-observing), and 3.25 (recall-guessing). In agreement with the transformed total errors analysis, the anticipation-guessing mean differed significantly from each of the other three means ($p < .001$, Duncan's test), and no other comparisons were significant. In the overall analysis of Trials 2 and 3, no other main or interaction effects approached significance ($ps > .10$).

Thus, the instructions to guess on the first trial seem to have had a debilitating effect on performance only under the anticipation procedure. This finding may have resulted from the Ss' initial inability to distinguish between or keep separate PRs and RCRs under the anticipation procedure. The fact that serial ordering did not lead to better learning than random ordering is consistent with findings by Martin & Saltz (1963) in paired-associate learning. The results of the study indicated, however, that variations in methodology should be taken into account in designing and comparing VD studies, and that when different-sexed Ss are used in a VD experiment, they should be assigned equally to all experimental conditions.

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Monetary, affective, and intrinsic incentives in choice reaction time*

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A female undergraduate, highly trained and practiced in hypnotic techniques, served as the S in a one-choice reaction-time task carried out under three different incentive conditions. Upon viewing her score in milliseconds after each trial, she referred to a chart converting raw scores to an 11-point scale ranging from +5 to −5. In the monetary condition, each point was worth 5 cents; in the posthypnotically cued affective condition, each point represented a degree of pleasure or anxiety; and in the intrinsic incentive condition, the points had no additional value. Comparisons of the obtained distributions of responses showed no significant differences among the conditions.

In Annett's (1969) words: "Until recently there has been little interest in the role of payoff in reaction time but since instructions involve implicit payoffs some standardization of experimental technique by providing explicit payoffs seems desirable." Johanson (1922) compared punishment and feedback conditions with no feedback; and McCormack, Binding, & Chylinski (1962) also compared feedback to no feedback. However, there have been no comparisons of different incentives applied to a one-choice reaction-time task with feedback. The availability of a very susceptible highly trained and practiced female undergraduate hypnotic S, capable of regulating her feelings of pleasure and anxiety in degree by means of posthypnotic cues, permitted us to compare affective reinforcement (pleasure-anxiety) with two other commonly used incentives, material gain (money) and intrinsic reward of doing well in a task (points). The three incentive conditions were compared for their effect upon S's performance in a one-choice reaction-time task.

METHOD

The S sat in a soundproof booth in front of a display panel which included the following: a warning light, a Plexiglas rod with two lights built in, a reaction-time score feedback window, a chart adjacent to the window indicating point equivalents for the reaction-time scores (see Table 1), and a card indicating the particular incentive condition ("points," "money," or "cues") for that block of trials. S's task was to hold the Plexiglas rod between the thumb and forefinger of her left hand (nonpreferred) and to move the rod at least 0.3 mm toward or away from her, depending on whether the half of the rod toward or away from S lit up (Way & Gottsdanker, 1968). On a given trial the warning light flashed for 50 msec. After her response of pushing the rod in one direction or the other, S received visual feedback of her reaction time in milliseconds. S was then given 7 sec to look at the point-equivalents chart (Table 1) in order to translate her reaction-time score into points.

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Table 1
Point Equivalents for Reaction Times in Msec

Under 160	=	+5
16_	=	+4
17_	=	+3
18_, 19_	=	+2
20_, 21_	=	+1
22_, 23_, 24_, 25_	=	0
26_, 27_	=	−1
28_, 29_	=	−2
30_, 31_	=	−3
320 and over	=	−4
Any error	=	−5

Table 2
Frequency Distribution of Money, Affect, and Point Responses Falling in Each Category of the Point Equivalents Chart

Point Equivalents	Money	Affect	Points
+5	1	5	2
+4	4	2	4
+3	4	7	3
+2	17	16	22
+1	44	39	40
0	89	83	82
−1	26	22	24
−2	11	18	13
−3	6	7	9
−4	8	5	4
−5	10	18	19
	220*	222*	222*

**Total N less than 225 because of occasional mechanical failures.*

The value of the points varied with each of the three conditions. The "points" condition served merely as an intrinsic incentive, since no additional values were involved. In the "money" condition S knew that for each point earned she would receive 5 cents, and for each point lost she would lose 5 cents, making a maximum gain or loss of 25 cents on a single trial. In the "affect" condition S had time to experience about 2 sec of the appropriate type and degree of affect before the warning light for the next trial. The values of the cues ranged from +5 through 0 to −5, corresponding with the point-equivalents chart.[1] Thus, on a given trial, if S responded, for example, in 177 msec, she would have earned either 3 points in the "points" condition or 15 cents in the "money" condition, or about 2 sec of +3 level of pleasure in the "affect" condition.

Errors were responses made either before the Plexiglas rod lit or else made in the wrong direction. S was not directly informed of errors but appeared, on the basis of earlier trials, to be consistently aware of their occurrence. Prior to the present experiment she had gained considerable familiarity with the reaction-time task in the course of other experiments. Actually, her earlier performance provided an empirical base for the point-equivalents chart utilized in the present study.

Trials were run in blocks of 25 with the incentive condition constant over the block. Nine blocks were run a day, in three groups of three blocks. Each group contained one block of each condition. The order of the conditions within groups was varied so that each possible order was administered once a day. The experiment was run over 3 days, with a total of 27 blocks, 9 in each condition.

RESULTS AND DISCUSSION

None of the statistical analyses performed on the data revealed significant differences among the monetary, affective, and intrinsic incentives. Table 2 presents the frequency distribution of money, affect, and point responses falling in each category of the point-equivalents chart. A chi-square analysis based on these entries was clearly insignificant. Separate analyses of variance using the raw reaction-time scores and the point equivalents likewise failed to turn up any differences even approaching significance. Mean reaction times in milliseconds (excluding error trials) were virtually identical for the three conditions: 237 for affect and points, 240 for money.

This failure of three dissimilar types of incentives to affect reaction time differentially cannot reasonably be attributed to lack of meaning for S of either money or affect. In the waking inquiry at the conclusion of the experiment, S said, "I had hysterics every time I made a mistake," and expressed concern over how much money she must have lost over the days (actually only a net loss of $1.85 in this money condition). She added that, in order to overcome the fear of losing "tons and tons of money, I would change my attitude as a defense and say it's all for the good of science and try to relax." The points condition was described as "really fun, nothing at stake, just trying to outdo myself."

In a subsequent inquiry under hypnosis, where amnesia no longer applies, S commented that the affect condition was especially draining emotionally, "On money trials I could put up a defense, but with the cues I couldn't do anything about it." She felt that her scores were probably best of all in the points condition because there was less pressure than with money and a more positive attitude than with cues because of the absence of anxiety. When asked to make hypothetical choices, she responded that she would give up 25 cents rather than experience a couple of seconds of −5 anxiety, and would prefer the +5 pleasure to winning 25 cents. (A systematic study by Fabrikant of monetary equivalents of degrees and durations of pleasure conducted some time later in our laboratory with the same S revealed highly significant linear trends between amount of money and both degree and duration of pleasure. On the average, each step increase in pleasure was worth an additional 58 cents.)

We can therefore conclude that strengthening the impact of incentives, either by monetary or affective manipulations, does not alter this S's reaction time responses from the pattern produced by the intrinsic, less involving "points-only" incentive. From the work of Johanson (1922) and McCormack, Binding, & Chylinski (1962), we might assume that all three of our incentive conditions had a facilitating effect compared to a no-feedback condition. This assumption can easily be checked. A question of further interest concerns the potential effects of separating the positive and negative incentives, e.g., money only to be won vs only to be lost; pleasure only vs anxiety only. From these and related explorations, it should be possible to fill in our knowledge of the influence of a variety of explicit payoffs upon reaction time.

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NOTE

1. Previously S had received extensive hypnotic programming to enable her to respond immediately to posthypnotic affective cues in the waking state, with amnesia for the prior training. The hypnotic training began with vivid reliving of S's prior experiences of pleasure and anxiety and later the affects were detached from their antecedent conditions in the form of "free-floating" pleasure and anxiety. S also learned to experience each affect in degrees ranging from the neutral midpoint of 0 to +5, the extreme of pleasure, and −5, the extreme of anxiety. Details of similar training procedures can be found in Blum, 1967.