OVERJUSTIFICATION EFFECTS IN TOKEN ECONOMIES

E. B. FISHER, JR.

WASHINGTON UNIVERSITY

This study tested the relevance to clinical token economies of the overjustification hypothesis that tangible reward interferes with intrinsic interest in target behaviors and causes such behaviors to be less probable following a period of reinforcement than preceding such a period. The study was carried out in an ongoing token economy for chronic psychiatric patients. Alternated over an 8-week period were weeks of token and no-token reward for one of the program's target behaviors, toothbrushing. Two different amounts of token reward were employed in order to examine whether reward magnitude might influence the presence or extent of overjustification effects. Little evidence was found for the presence of overjustification effects in token economies. However, maintenance of toothbrushing was greater in no-token weeks following weeks of low amounts of token reward than in no-token weeks following weeks of higher amounts of reward. The importance of such complex functional relationships is discussed.

DESCRIPTORS: token economy, toothbrushing, maintenance, amount of reward, patients

According to the overjustification hypothesis (Nisbett and Valins, 1971), the performer of an activity that results in some tangible or extrinsic reward may come to attribute engaging

in the activity to the extrinsic reward. Consequently, if the extrinsic reward is withdrawn, the performer may see little reason for continuing in the activity and may be less likely to engage in it than before the institution of extrinsic reward. Such a reduction in the likelihood of behavior has been termed an overjustification effect. Operational criteria for overjustification effects entail a behavior of some appreciable frequency without reinforcement which is reinforced for a limited time and, then, after the termination of reinforcement, is less frequent than it had been prior to the reinforcement. In such a case, the reinforcement would have been counterproductive, for it led to a reduced frequency of the target behavior. Early demonstrations of overjustification effects were provided by Deci (1971, 1972) and by Lepper, Greene, and Nisbett (1973), among others.

At least at a superficial level, the overjustification hypothesis seems similar to such "common sense" objections to some behavior therapy programs as that tangible rewards might spoil their recipients, that such rewards amount to

This research has been supported by Washington University Faculty Research stipends and PHS predoctoral research fellowship #2-F01-MH45774-03 to the author and by PHS research grant #11938, Leonard Krasner, Principal Investigator. This research was completed as part of the author's doctoral dissertation at the State University of New York at Stony Brook. Serving as the dissertation committee were Gerald C. Davison, Stuart Valins, James Calhoun, and Norman Goodman, all of whom are greatly appreciated for their help in planning and interpreting the results of the research. The author is also indebted to Leonard Krasner, Robin Winkler, Raymond Battalio, and John Kagel for their help in placing the current research in the broader context of token economies viewed as complex economic systems and to Drs. Winkler and Krasner and C. Steven Richards for having established the token program. Thanks are also due the patients and staff of Central Islip State Hospital, Central Islip, New York, especially Peter Goode, Joan Hignchi, and Susan Hanye. Reprints may be obtained from E. B. Fisher, Jr., Department of Psychology, Washington University, St. Louis, Missouri 63130.

bribery, and that people ought to engage in proper behavior (*e.g.*, children completing chores, coming home on time) because it is "right," not because there is "something in it for them." Such concerns are probably familiar to those experienced in behaviorally oriented consulting or parent training and have received general consideration in the literature several times (*e.g.*, O'Leary, Poulos, and Devine, 1972).

General defenses of behavior therapy programs notwithstanding, several authors have suggested that overjustification effects may be created by token economies and other programs utilizing contingent rewards (*e.g.*, Levine and Fasnacht, 1974). However, the relevance to clinical token economies of overjustification research conducted in laboratory settings needs consideration. For instance, two of the early reports of such effects were based on undergraduates studied in social psychology laboratories for 3 hours (Deci, 1971) or 1 hour (Deci, 1972). Another report of overjustification effects was based on preschool children observed for several hours in their classrooms before and 7 to 14 days after an approximately 15-minute manipulation in which two experimenters they had never met administered an experimental task and extrinsic rewards (Lepper *et al.*, 1973). Clearly, such manipulations differ in numerous ways from token contingencies to which individuals are subject 24 hours per day for extended periods.

Further bases for questioning the prevalence in clinical token economies of overjustification effects are provided by Feingold and Mahoney (1975) who failed to find such effects with second-grade students studied for 30 days in daily, 15-minute sessions conducted in their regular school (but not in their regular classrooms). Supporting the relevance of the overjustification notion, however, is a recent demonstration of such effects among fourth- and fifth-graders. The children were studied through about 40 daily sessions of a math laboratory which was conducted in conjunction with other mathematics instruction and which used an ongoing

system of extrinsic rewards (Greene, Sternberg, and Lepper, 1976).

The purpose of the study reported here was *not* to make a conclusive test of the validity of the overjustification hypothesis. Rather, it was to examine the possible impact of such effects in an ongoing token economy. In doing so, the present study may also help develop a clearer understanding of the conditions necessary to produce such effects or to prevent them. A conclusion as to whether such conditions, when fully known, will be explicable in the terms of the overjustification hypothesis is, however, beyond the scope of this paper.

The present research examined the effects of two token wages on toothbrushing in a token economy for chronic, adult, female, psychiatric patients. Toothbrushing was chosen because it is the type of behavior which is typically manipulated in token economies but for which individuals are not *saliently* rewarded in the real worlds to which they are discharged. With such behaviors, post reinforcement maintenance and overjustification effects may be of special concern.

Two token wages were alternated with non-reward in order to evaluate whether amount of reward would influence the extent to which external rewards might undermine intrinsic interest. This was based on the common finding in the cognitive dissonance literature that amount of reward influences attitudes about rewarded behavior (Bem, 1967; Festinger and Carlsmith, 1958). In these studies, large rewards either eliminated dissonance otherwise arising from counterattitudinal behavior or eliminated the tendency for behavior to be taken as an indication of the individual's feelings or attitudes. If large rewards cause behavior not to be taken as indicative of attitudes or feelings, then they might increase overjustification effects by causing individuals to attribute behavior less to their own interests and more to external contingencies. If individuals decide their interest is not great, the frequency of the behavior, in the absence of extrinsic reward, should decrease.

METHOD

Experimental Setting

The token economy was established on a ward for chronic, female patients of a large state hospital. It had been in operation for 20 months prior to the study and provided tokens for care of self and surroundings, attendance at activities, and participation in off-ward rehabilitation programs. Tokens were exchangeable for cigarettes, coffee, other consumable snacks, use of grounds passes, private or semi-private rooms, private lockers, and clothing from a used clothing store run by volunteers. Fighting or stealing resulted in restriction on the earning or use of tokens from 4 to 48 hours.

Subjects

During the course of the study, 29 patients were on the ward. They ranged in age from 15 to 64 with a median age of 41 years, 6 months (mean = 43 years, 6 months). They had been hospitalized from less than 2 to over 39 years (median = 14 years; mean = 16 years, 6 months). Thirteen had been in the token economy over 1 year, ten over 6 months, five from 3 to 6 months, and one arrived on the ward during the study. Nineteen (66%) were diagnosed as psychotic (mostly schizophrenic), three (10%) had organic brain syndromes, six (21%) were mentally retarded, and one (3%) was diagnosed as having a behavior disorder associated with adolescence.

Procedure

The study was carried out over a 12-week period, starting with 4 weeks of suspended token reward for toothbrushing and then alternating each week between token reward and no-token reward. The first and third *token* weeks consisted of daily reward of five tokens for toothbrushing, while the second and fourth *token* weeks consisted of one-token reward (see Figure 1).

Prior to the study, ward attendants distributed patients' individual toothbrushes and toothpaste

each morning between 9 and 10 o'clock. This was done for about 20 months before the beginning of the study, during which patients earned one token for toothbrushing. At the start of the study, token reward for toothbrushing was suspended until the baseline toothbrushing rate was sufficiently stable to allow evaluation of subsequent manipulations. This took 4 weeks, during the last 2 of which the rate was stable (see Figure 1). Therefore, these last 2 weeks were treated in the results as the baseline period. Throughout all 12 weeks, student assistants were substituted for attendants so that toothbrushing would be as voluntary as possible because, for the ward residents, students were of less authority than attendants.

Between 9:00 and 9:30 a.m., 6 days per week, two students ran the toothbrushing procedure, starting by announcing throughout the ward that "It's time for toothbrushing, ladies. Come brush your teeth." This announcement was made twice before the dispensing of brushes and toothpaste, once during the middle of the procedure, and once at the end, coupled with a warning that the brushes and paste were about to be put away. Patients obtained their own brushes with some paste put on them by one assistant as they approached. They then went into the bathroom to the sinks, brushed their teeth, and a second assistant recorded their brushing. (The recording assistant was to remind patients to brush longer if they did not brush for at least 10 seconds, but none of the patients whose data are reported needed to be reminded.) The patients then returned their brushes to the first assistant back in the dayroom. The patients were aware that their brushing was being recorded, even when no tokens were being distributed.

Following the completion of the actual brushing, the student assistants made out tokens (during token reinforcement weeks) for those who brushed and distributed them within one-half hour of the time all brushing was completed. The tokens had a space marked "Job" in which the name of the token-earning activity was

written by whoever dispensed them. In this space was put "Toothbrushing" for this procedure, and, in distributing the toothbrushing tokens, the assistant told each recipient, "Here is (are) your token(s) for toothbrushing."

Each Monday, when the reward contingencies were changed, the author, who managed the token economy, announced the new contingency, saying, "Attention, ladies. Starting today, we are giving one/five token(s) for toothbrushing. We are giving one/five token(s) for toothbrushing." On zero-token weeks, the announcement was, "Attention, ladies. Starting today, we are *not* giving any tokens for toothbrushing. We are giving no tokens for toothbrushing." These announcements were repeated elsewhere in the ward. Additionally, a sign describing the current contingency was placed on a bulletin board near the bathroom door. Each morning, while announcing that it was time for toothbrushing, the assistants announced the current reward condition.

RESULTS

Of the 29 patients in the subject pool, the data for 16 were excluded prior to data analysis. Three patients were excluded because, for reasons beyond their control, they were unavailable for toothbrushing four or more times in one week or three or more times in more than one week. Two were excluded because they had no teeth. Seven were excluded because they participated very little in the token economy and other activities on the ward. (The criterion for this exclusion was the earning of less than an average of 10 tokens per week for the last four weeks of the study.) One was excluded because of profound mood swings which affected virtually every aspect of her behavior, including toothbrushing. This patient brushed 80% of opportunities in the first five-token week and 0% in the second five-token week. She brushed 33% of opportunities in the first one-token week and 0% in the second. Clearly, her behavior was responsive to factors other than

those controlled or anticipated by the experiment. Finally, one was excluded because, during the zero-token weeks, she would frequently beg that she thought she was supposed to get tokens and she would get very angry and/or cry that those who refused her tokens were cheating her. This pattern of behavior indicated that her brushing in zero-token weeks may have been maintained by the possibility of earning tokens, even though no tokens were forthcoming. Because the conceptual basis of the study dictated that brushing in zero-token weeks be dependent on consequences *other* than tokens, her data were not included in the main analyses. Because the reason for this exclusion was a behavior pattern possibly related to *heightened* brushing rates in the zero-token weeks, it was a conservative exclusion in terms of the test of the overjustification effect.

The median age of the 13 patients included in the study was 39 years and their median length of hospitalization was 13 years, 4 months, both very close to those for all 29 patients on the ward. Of the 13 patients, five had been on the ward over 1 year, five had been on the ward from 6 to 12 months, and three had been on the ward from 3 to 6 months at the time this study was begun. All were diagnosed psychotic.

Because some subjects were not available for toothbrushing every day, the ratio of times brushing per week divided by opportunities for brushing per week was used in the data analyses. This allowed patients' weekly scores to be treated equivalently, regardless of the number of times they were available for toothbrushing each week. However, if any patient were unavailable for toothbrushing 4 or more days in a single week or 3 or more days in more than 1 week, her data were excluded from the analyses.

Figure 1 presents the mean ratios for all patients whose data were included in analyses for the 2-week baseline period and for each of the 8 weeks following it. Table 1 presents the individual toothbrushing ratios for each week and averaged for each experimental condition. These data were analyzed through an analysis of vari-

Table 1

Weekly toothbrushing ratios for each patient and mean ratios for each condition for each patient.

Patient No.	Week Number										Condition				
	1	2	3	4	5	6	7	8	9	10	Five To- kens	One To- ken	Base- line	Zero Post Five	Zero Post One
	Wage														
	0	0	5	0	1	0	5	0	1	0					
1	.50	.17	1.0	.17	1.0	.33	1.0	.33	.83	.40	1.0	.92	.34	.25	.37
2	.33	.33	.75	.67	.67	.80	1.0	.33	.50	.20	.88	.59	.33	.50	.50
3	.50	.83	1.0	.83	1.0	.83	1.0	.83	1.0	1.0	1.0	1.0	.67	.83	.92
4	.20	.67	1.0	.83	.50	.50	.83	1.0	.67	1.0	.92	.59	.44	.92	.75
5	.83	1.0	.80	0.0	.50	.67	1.0	.83	1.0	1.0	.90	.75	.92	.42	.84
6	1.0	.75	1.0	.25	1.0	.83	1.0	.80	1.0	1.0	1.0	1.0	.88	.53	.92
7	1.0	.83	1.0	.83	.67	1.0	1.0	1.0	1.0	1.0	1.0	.84	.92	.92	1.0
8	.83	.67	1.0	.67	.83	.50	.83	.83	1.0	.60	.92	.92	.75	.75	.55
9	1.0	.83	1.0	.83	.83	1.0	1.0	1.0	.83	1.0	1.0	.83	.92	.92	1.0
10	.17	.20	.60	.17	.33	.33	1.0	.17	.17	.20	.80	.25	.19	.17	.27
11	.33	.40	.40	.33	.50	.60	.50	0.0	.67	.60	.45	.59	.37	.17	.60
12	.40	.17	1.0	.17	.50	.50	1.0	.67	.83	.40	1.0	.67	.29	.42	.45
13	.83	1.0	1.0	1.0	1.0	1.0	1.0	.83	1.0	1.0	1.0	1.0	.92	.92	1.0
Weekly Means:	.61	.60	.89	.52	.72	.68	.94	.66	.81	.72	.91	.76	.61	.59	.70

Fig. 1. Mean toothbrushing ratios for all subjects for each week of toothbrushing study ($n = 13$).

ance in which patients and conditions were treated as independent factors and the number of replications of each condition for each patient was treated as a variable nested within each patient-condition combination (Gentile, Roden, and Klein, 1972). A significant main effect for token reward conditions $F(4, 65) = 13.8$, $p < .001$ was partitioned among several comparisons. The first two demonstrated that brushing

ratios were higher during token weeks than during baseline and subsequent zero-token weeks, $F(1) = 40.4$, $p < .001$, and were higher during five-token weeks than during one-token weeks, $F(1) = 9.06$, $p < .005$. These comparisons demonstrated reinforcement effects of token reward and a differential effect of the amount of token reward.

The overjustification hypothesis was tested by a third orthogonal comparison between the mean ratio during baseline and the mean of the ratios during zero-token weeks following *both* one- and five-token reward. This comparison failed to support the overjustification effect, $F(1) = < 1.0$.

A fourth orthogonal comparison evaluated differential effects of five- and one-token reward during the zero-token weeks which followed them. As is apparent in Figure 1, the mean of the ratios in the 2 zero-token weeks following one-token reward is greater than the mean for the zero-token weeks following five-token reward, $F(1) = 5.125$, $p < .05$.

Further analyses were conducted to see if any differences indicative of an overjustification ef-

fect might be found. From Figure 1, it can be seen that the mean of the first zero-token week following five-token reward, week 4, is less than the mean baseline ratio (.519 vs. .599). However, a t test of this difference was not significant, $t(12) = .785$. Nonparametric analyses of numbers of patients whose week 4 ratios were higher (7 of 13) or lower than their baseline ratios, produced no evidence for overjustification effects. Breaking down the individual records, only 4 of 13 subjects had baseline average ratios higher than their averages for all zero-token weeks and only 5 of 13 had baseline averages greater than their average ratios for the 2 zero-token weeks following five-token reward. However, 11 of 13 showed higher average ratios in the zero-token weeks following one-token reward than in those following five-token reward.

One might expect that those with high initial interest in a behavior, having more interest available to be undermined, might be more susceptible to overjustification effects than those with little initial interest in the behavior. Breaking the distribution of mean baseline ratios at the median, groups with high ($n = 7$) and low ($n = 6$) initial interest in toothbrushing were identified. For each patient, the difference between the baseline mean and the mean of the 4 zero-token weeks was calculated, but the two groups did not differ significantly on these differences, $t(11) = 1.587$, $p < .20$. Neither did they differ significantly on the difference between the baseline mean and the mean of the first zero-token week following five-token reward, week 4, $t(11) = 1.587$, $p < .20$. This difference between baseline mean and the mean of the week following the first week of five-token reward was also evaluated for the high initial interest group taken alone, but was not significant, $t(6) = 1.467$, $p < .20$. In addition to showing only nonsignificant trends which are confounded with tendencies for regression toward the mean, these tests are *post hoc* and should be evaluated conservatively. They dem-

onstrate that, even with thorough searching, the present data may be found to contain little evidence for overjustification effects.

DISCUSSION

In this study, the overjustification effect was operationalized as a *decrease* in responding following token reward, relative to unreinforced response frequencies prior to token reward. With this operational definition, little evidence was found for such effects in a therapeutic token economy other than several nonsignificant trends indicative of greater tendencies for overjustification effects among those with high initial interest in toothbrushing. Thus, the present results are generally consistent with Feingold and Mahoney's (1975) findings of little evidence for overjustification effect in an ongoing token economy.

It is intriguing that overjustification effects have been found reliably in the laboratory but, with the exception of Greene *et al.* (1976), have not been reported in therapeutic token economies. As noted in the introduction, the circumstances employed in laboratory studies of overjustification effects have been unusual and/or short-lived. In contrast, the present study was conducted within a program and ward in which patients spent much of their daily lives for extended periods of time. It may be that these patients did not show overjustification effects because they were accustomed to the experimental environment and the token procedures typically employed. They may have been less easily distracted from the intrinsic rewards for toothbrushing.

Emphasizing the role of distraction in overjustification effects, Reiss and Sushinsky (1975) suggested that reported overjustification effects might be caused by extrinsic, salient rewards either distracting subjects from other rewards available for target behaviors or eliciting competing responses which reduce the pleasureableness of the target behavior. Supporting such a view is the fact that several of the laboratory

studies employed particularly striking or unexpected rewards in producing overjustification effects. For instance, subjects in Deci's (1971, 1972) studies volunteered in order to fulfill course requirements but were probably surprised to find they could earn up to \$3 (1971) or \$4 (1972) for their efforts. In Lepper *et al.* (1973), subjects were taken to the "surprise room" where they were told they would receive a "good player award" if they agreed to draw some pictures for an individual who had "come to the nursery school for a few days to see what kinds of pictures boys and girls like to draw with magic markers."

Evidence that overjustification effects, in fact, could be created by manipulating the distracting characteristics of unusual rewards employed for brief periods was found by Reiss and Sushinsky (1975). They obtained overjustification effects with a brief, 1-trial manipulation, but did not obtain such effects with a 10-trial manipulation of rewards. Similarly, Kruglanski, Riter, Amitai, Margolin, Shabrai, and Zaksh (1975) found that intrinsic motivation was *increased* by monetary rewards normally employed in a popular game but was decreased when monetary rewards were employed in games not generally associated with such incentives. It seems that overjustification effects may not be due to tangible reward, *per se*, but to unusual rewards, rewards employed in an unusual manner, and, perhaps, unusual circumstances, such as brief experimental manipulations conducted outside of the situations in which people live their daily lives.

More evidence, consistent with the suggestion that overjustification effects result from unusual or distracting rewards employed for short periods, is the observation of some tendency toward an overjustification effect during week 4, following the first week of five-token reward. Most demonstrations of overjustification effects have employed only one period of token reward, followed by no-reward (Deci, 1971, 1972; Greene *et al.*, 1976; Lepper *et al.*, 1973). If the

present study had been in keeping with such practices and ended after week 4, it might have been taken as providing modest support for overjustification effects in token programs. For the purposes of understanding clinical interventions, it is important to evaluate the extended effects of such interventions when employed over a substantial time period.

The present study found little evidence for overjustification effects in an ongoing token program. However, as mentioned above, Greene *et al.* (1976) did provide evidence of overjustification effects in a classroom token economy. The Greene *et al.* (1976) study was a very complex one in which fourth- and fifth-grade children received tokens for work on various of four similar sets of math laboratory activities during 13 daily sessions. The results from one of the experimental groups ("High Interest") could be explained as the result of boredom produced by response rates elevated by selective reinforcement (Mynatt, Oakley, Arkkelin, Piccione, Margolis, and Arkkelin, 1978), while those of another group ("Low Interest") may simply represent the effects of deprivation of the opportunity to engage in high probability behaviors brought about by reinforcement of alternative, mutually exclusive behaviors. Such deprivation effects have been demonstrated in the animal literature, *e.g.*, research on the Premack principle (Premack, 1965). However, a pattern more suggestive of an overjustification process was shown in the "Choice Group" in which subjects were rewarded for activities which they chose from among several alternatives. Subsequently, they were less likely to engage in those activities than they had been prior to the reward phase. While it may be that this pattern can be explained as a deprivation or boredom effect as for those of other experimental groups, Greene *et al.* (1976) suggest that something other than simple boredom or deprivation influenced the Choice Group. They argue that actually choosing preferred activities may have influenced the overjustification

pattern subjects demonstrated, noting that such choosing "elicits an overt commitment from the subject and explicitly directs the subject's attention to the consequences of his behavior" (1976, p. 1230). (This observation may be consistent with the argument that overjustification effects are produced by salient, distracting manipulations.)

Critical to the concerns of the present paper is how an overt commitment such as produced with the Choice Group might be evoked by clinical reinforcement procedures. Clinical procedures may ask participants to select treatment goals but do not usually require that individuals choose to commit themselves for no apparent purpose and for an extended period to a subset of a group of fairly equivalent therapeutic activities. Thus, the Choice Group may well have demonstrated an effect which cannot be explained without concepts like overjustification. However, the way in which this group was treated differently from individuals in clinical programs highlights, again, the central point of the present paper, that overjustification effects do not appear to figure strongly in applied, clinical operant programs.

The criticism that the experimental manipulation of the Choice Group is atypical of clinical procedures is also applicable to the other experimental conditions. They, too, included differential reinforcement of preferences among the four sets of mathematics activities. Such differential reinforcement of equivalent behaviors is rarely employed clinically. Greene *et al.* (1976) indicated other respects in which they minimized clinical aspects of their program. The understanding of those overjustification effects which have been demonstrated remains incomplete. Nevertheless, there seems to be little evidence that such effects are the outcome of conventional, clinical token economies.

The present study was conducted after the token program had been in effect for over 1 year. Thus, the patients had much experience with tokens in general and, more specifically, with token wages for toothbrushing. It may

have been that overjustification effects on toothbrushing had already occurred and that the 4-week suspension of tokens preceding the first five-token week did not mitigate such effects. There are no data within the present study to show that such a suggestion is wrong. However, if such a suggestion holds that a 4-week baseline is insufficient to allow a test for overjustification effects, then it would seem unlikely that one could specify those aspects of an individual's prior history that would determine the likelihood of such effects in a nonlaboratory setting.

Evidence for overjustification effects was not found in this study, but there was evidence for an effect of a sort not typically examined in the applied behavior analysis literature. Recall that toothbrushing ratios were higher during the zero-token weeks following one-token reward than during the weeks following five-token reward. Although five-token reward was more effective than one-token reward while these reward values were in effect, it was less effective than the lesser amount of reward when judged in terms of maintained brushing levels. As suggested by O'Leary *et al.* (1972), this finding should be of importance to planners of operant programs who may increase chances of maintained changes by using amounts of reward during training which are at the lowest level sufficient to maintain and shape target behaviors.

This effect of the relative amount of reward on maintenance may be explicable in attributional terms such as those employed in the overjustification hypothesis. Regardless of how it is explained, it indicates the importance of looking at complex, extended effects of single manipulations and the effects of such manipulations as they interact with other aspects of programs in which they are employed. It may be that social psychological concepts are more helpful in articulating such complex interdependencies among program components than are basic operant notions, traditionally based on the molecular analysis of individual contingencies in highly simplified experimental arrangements. However, the inferences of social psy-

chology may not be necessary to extend operant notions to address complex interdependencies. Concepts of consumer economics have been found helpful in increasing the understanding of complex effects in token economies (see Fisher, Winkler, Krasner, Kagel, Battalio, and Basmann, 1978; Kagel, 1972; Kagel and Winkler, 1972; Winkler, 1971, 1973) and in expanding the range of investigation in the operant laboratory (Rachlin, Green, Kagel, and Battalio, 1976).

REFERENCES

- Bem, D. J. Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review*, 1967, **74**, 183-200.
- Deci, E. L. Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, 1971, **18**, 105-115.
- Deci, E. L. Intrinsic motivation, extrinsic reinforcement, and inequity. *Journal of Personality and Social Psychology*, 1972, **22**, 113-120.
- Feingold, B. D. and Mahoney, M. J. Reinforcement effects on intrinsic interest: Undermining the overjustification hypothesis. *Behavior Therapy*, 1975, **6**, 367-377.
- Festinger, L. and Carlsmith, J. M. Cognitive consequences of forced compliance. *Journal of Abnormal and Social Psychology*, 1959, **58**, 203-210.
- Fisher, E. B., Jr., Winkler, R. C., Krasner, L., Kagel, J., Battalio, R. C., and Basmann, R. L. Economic perspectives in behavior therapy: Complex interdependencies in token economies. *Behavior Therapy*, 1978, **9**, 391-403.
- Gentile, J. R., Roden, A. H., and Klein, R. D. An analysis-of-variance model for the intrasubject replication design. *Journal of Applied Behavior Analysis*, 1972, **5**, 193-198.
- Greene, D., Sternberg, B., and Lepper, M. R. Overjustification in a token economy. *Journal of Personality and Social Psychology*, 1976, **34**, 1219-1234.
- Kagel, J. H. Token economies and experimental economics. *Journal of Political Economy*, 1972, **80**, 779-785.
- Kagel, J. H. and Winkler, R. C. Behavioral economics: Areas of cooperative research between economics and applied behavioral analysis. *Journal of Applied Behavior Analysis*, 1972, **5**, 335-342.
- Kruglanski, A. W., Riter, A., Amitai, A., Margolin, B.-S., Shabtai, L., and Zaksh, D. Can money enhance intrinsic motivation?: A test of the content-consequence hypothesis. *Journal of Personality and Social Psychology*, 1975, **31**, 744-750.
- Lepper, M. R., Greene, D., and Nisbett, R. E. Undermining children's intrinsic interest with extrinsic rewards: A test of the overjustification hypothesis. *Journal of Personality and Social Psychology*, 1973, **28**, 129-137.
- Levine, F. M. and Fasnacht, G. Token rewards may lead to token learning. *American Psychologist*, 1974, **29**, 816-820.
- Mynatt, D., Oakley, T., Arkkelin, D., Piccione, A., Margolis, R., and Arkkelin, J. An examination of overjustification effects under conditions of extended observation and multiple reinforcement: Overjustification or boredom. *Cognitive Therapy and Research*, 1978, **2**, 171-177.
- Nisbett, R. E. and Valins, S. *Perceiving the causes of one's own behavior*. New York: General Learning Press, 1971.
- O'Leary, K. D., Poulos, R. W., and Devine, V. T. Tangible reinforcers: Bonuses or bribes. *Journal of Consulting and Clinical Psychology*, 1972, **38**, 1-8.
- Premack, D. Reinforcement theory. In D. Levine (Ed), *Nebraska symposium on motivation*. Lincoln: University of Nebraska Press, 1965.
- Rachlin, H., Green, L., Kagel, J. H., and Battalio, R. C. Economic demand theory and psychological studies of choice. In G. Bower (Ed), *The psychology of learning and motivation*, Vol. 10. New York: Academic Press, 1976.
- Reiss, S. and Sushinsky, L. W. Overjustification, competing responses, and the acquisition of intrinsic interest. *Journal of Personality and Social Psychology*, 1975, **31**, 1116-1125.
- Winkler, R. C. The relevance of economic theory and technology to token reinforcement systems. *Behaviour Research and Therapy*, 1971, **9**, 81-88.
- Winkler, R. C. An experimental analysis of economic balance, savings and wages in a token economy. *Behavior Therapy*, 1973, **4**, 22-40.

Received 16 February 1978.

(Final Acceptance 15 November 1978.)