A Study of Reward Preference in Taiwanese Gifted and Nongifted Students With Differential Locus of Control

Su Chen Wu
University of New South Wales

Robert T. Elliott
Australian National University

The purpose of the study was to investigate whether gifted and nongifted students' preferences for different types of reward were affected by differential locus of control. In total, 181 gifted and 107 nongifted junior high school students in Taiwan participated. The Nowicki-Strickland Locus of Control Scale was used as a measure of locus of control. A survey of reward preference was designed to look at students' evaluations of the reward systems. The results showed that the gifted students tended to evaluate competition rewards significantly higher when compared to the nongifted students; the nongifted students tended to evaluate chance rewards significantly higher than the gifted students. However, there was no significant difference between the gifted students and nongifted students in their evaluation of performance rewards. An interaction effect between ability and locus of control for chance rewards indicated that the nongifted/moderate and nongifted/external students preferred chance rewards more than the other groups. Irrespective of ability level, however, the findings indicated that the higher the internality, the higher were the students' preferences for the contingent (competition and performance) rewards.

Behavioral theorists, such as Thorndike (1905), described a relationship between people's environment and their behavior. The law of effect, formulated by Thorndike, suggested that if a response were followed by a pleasing event, the association between the stimulus and the response was strengthened. If it were followed by an unpleasant incident, the association was weakened (Carlson, 1993; Lu, 2005). Further expanding on these concepts, Skinner's radical behaviorism

Su Chen Wu received her Ph.D. in education from the University of New South Wales, Sydney, Australia in 2004; she is currently an Assistant Professor in the Department of Early Childhood Care and Education at the Meiho Institute of Technology, Taiwan. Robert T. Elliott obtained his Ph.D. in psychology from the Australian National University in 1976; he worked at the University of New South Wales between 1976 and 2002 and became a Full Professor in 1994.

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(Skinner, 1974) suggested that human behavior was determined by the relationship between a response and the consequence of that response, namely, a reward contingency (Klein & Mowrer, 1989). Skinner suggested that by means of manipulation of reward contingencies, that is, reward or no reward, learning and behavior changes in an individual may occur (Carlson, 1993).

However, Rotter's (1966) social learning theory locus of control construct suggested that generalizing laws of learning as illustrated above is a problematic procedure because the effect of rewards depends on how the person perceives a causal relationship between his or her behavior and the reward. If the person perceives a reward as contingent upon his or her own effort or ability (viz., internal locus of control), then the occurrence of a reward will strengthen the likelihood of that behavior recurring. If he or she sees a reward as not contingent upon ability or effort, that is, as a result of luck, chance, fate, or powers beyond personal control (viz., external locus of control), then the preceding behavior is less likely to be strengthened by the presence of a reward (Rotter, 1966). In general, Rotter suggested that individuals with an internal locus of control would place greater value on contingent achievement-related rewards.

In the past 20 years, the study of the locus of control construct in relation to reward contingency has appeared repeatedly in the literature; however, the findings are contradictory. For example, Trusty and Macan (1995) suggested that under contingent reward conditions, subjects with an internal locus of control (i.e., internals) desired more control over the procedures and types of tasks and performed better than did subjects with an external locus of control (i.e., externals), whereas subjects with an external locus of control desired more control over the types of tasks and performed better than did those with internal locus of control under noncontingent reward conditions. On the other hand, Kren (1992) investigated the moderating effects of locus of control on performance-contingent incentives in 44 undergraduate business students. The results indicated that internals and externals did not differ in outcomes under performance-contingent rewards, but internals made more effort on the task than externals did.

Previous research also has indicated that there is a relationship between academic ability and reward contingency on students' perfor-

mance. For example, Moran and Lion (1982) investigated the relationship between reward (reward vs. no reward), task (picture completion task vs. circles task) and ability (high ability vs. low ability) and suggested that reward led to a decrement of performance on the circles task for high-ability students but facilitated the performance in low-ability students. However, these findings are inconsistent with those of Winefield, Barnett, and Tiggemann (1984) who investigated 48 undergraduates with verbal IQ scores of 111–235 in an experiment involving contingent and noncontingent rewards. The results showed that higher IQ students tended to perform better under contingent reward, while lower IQ students showed no tendency to perform worse following exposure to uncontrollable outcomes.

In the relationship between academic ability and locus of control, Laffoon, Jenkins-Friedman, and Tollefson (1989) compared the mean locus of control of third-, fourth- and fifth-grade underachieving gifted (n = 36), achieving gifted (n = 39) and nongifted (n = 62) students and found that underachieving gifted and nongifted students were more external than their achieving gifted peers. These findings are consistent with those of Van Boxtel and Mönks (1992) who examined four groups of subjects (age 12 to 15 years): many-sided gifted achievers (n = 22), one-sided academically gifted achievers (n = 45), gifted underachievers (n = 27) and an average ability/achievement group (n = 74). The outcomes revealed that gifted underachievers tended to have a greater external locus of control than the control group (average in academic ability and academic achievement). However, McClelland, Yewchuk and Mulcahy (1991) found no support for a relationship between locus of control, giftedness, and academic achievement. In this study, the authors examined locus of control in underachieving (n = 87) and achieving gifted (n = 77) grade 6, 7, 8 and 9 students. The results showed that general locus of control measures did not differ between gifted underachievers and gifted achievers. Taken together, the literature reviewed to this point suggests that there may be moderating affects of locus of control on contingent reward and the level of academic ability in students. Therefore, an individual's characteristics should be taken into consideration when different types of reward are employed in educational settings.

Additionally, in terms of the effect of cultural differences and locus of control, Krampen and Wieberg (1981) found that German and

American students tended to have significantly higher internal locus of control scores than Japanese students. German students tended to have higher external (powerful others) locus of control scores than American and Japanese students, whereas German and Japanese students tended to have significantly higher external (chance) locus of control scores than American students.

In order to investigate whether gifted and nongifted students' evaluation for three types of rewards (competition, performance, and chance rewards) was affected by differential locus of control, research on Taiwanese students was conducted. The locus of control theory was investigated by examining the effects of different academic ability (gifted vs. nongifted) and differential loci of control (internal, moderate, external) on students' preferences for three different types of rewards (performance, competition, and chance rewards). The Nowicki-Strickland's Locus of Control Scale for Children (Nowicki & Strickland, 1973) was employed in the present study as a measure of locus of control.

Method

Participants

Previous research indicated that internality and academic achievement were positively related, and the correlation among adolescents was stronger than among children or young adults (Findley & Cooper, 1983; Kalechstein & Nowicki, 1997). Accordingly, 288 junior high school students aged 13 through 15 from four schools in Taiwan were selected to participate. The four schools were randomly selected from a school list on the Web site. They were categorized into two groups. One group was identified as gifted students (n = 181) from intellectually gifted classes. They had been identified on the basis of multiple criteria, including general intellectual ability, specific academic aptitude, achievement, and teacher nomination information used by the schools. The general criteria for the selection of gifted students in the intellectually gifted classes were (a) above the 90th percentile for term-one school achievement tests; (b) above

the 93rd percentile in the IQ test (e.g., Raven's Progressive Matrices); and (c) above the 97th percentile for specific achievement aptitude (math, science, and language). Under the competitive conditions in Taiwan, the majority of the selected students (approximately 8 out of 10) were at the 99th percentile in the IQ test. The other group was defined as nongifted students (n = 107) from normal classes with deviation IQ scores between 68 and 110 and with lower academic achievement. The permission to conduct the study was obtained from four school principals before the research started.

Instruments

The Nowicki-Strickland Locus of Control Scale (Nowicki & Strickland, 1973) was employed as a measure of locus of control. According to Nowicki and Strickland, the scale has good internal consistency and test-retest reliability. Estimates of internal consistency ranged from r = .63 for grades 3, 4, and 5 to r = .68 for grades 6, 7, and 8, and r =.81 for grade 12. Test-retest reliabilities across 6 weeks ranged from r = .63 for grade 3, to r = .66 for grade 7, and r = .71 for grade 10. The mean locus of control score of the 288 students was 15.03, and the range was from 3 to 29. In the present research, students were categorized as internal (with locus of control scores between 0–9; n = 37), moderate (with locus of control scores between 10–19; n = 200) and external (with locus of control scores between 20–29; n = 51). The 40-item scale was translated into Chinese by one of the researchers and proofread by a Mandarin speaker with a Bachelor of Science degree. The agreement on translation precision and fluency was scaled at 9.9 out of 10 by two bilingual professors with Ph.D.s in education.

A modified 18-item Likert-type questionnaire from Lu's (2005) study was used to investigate students' self-reported reward preferences. It was designed to look at students' opinions of the effectiveness of rewards and their motivation toward different rewards and satisfaction with the rewards system. According to the findings of the factor analysis in Lu's research, Participation Reward and Chance Reward were defined as one combined component instead of two components. On the other hand, although both Performance Reward and Competition Reward were contingent types of rewards,

they were evaluated somewhat separately by the students as two factors. Consequently, the present study deleted Participation Reward items, after which the scale assessed preferences for three different types of rewards: competition, performance, and chance rewards. Each reward was evaluated on three dimensions: effectiveness, motivation, and satisfaction (Wolf, 1978). There were three positive and three negative items for each type of reward. For example, Question 9 reads, "You find it satisfying when teachers decide who gets a prize by choosing names at random," and Question 6 states, "You dislike a reward system which is based on luck." Positive items were scored from 1 point (*strongly disagree*) to 6 points (*strongly agree*), and negative items were reverse scored.

An outline of the classification of the three types of rewards is as follows: Competition rewards are delivered to people who compete with others for a limited number of rewards and win (Ryan, Mims, & Koestner, 1983). Performance rewards are given to people who improve over their previous performance. Chance rewards are given to people on the basis of luck or chance.

Procedure

A combined survey of the Nowicki-Strickland Locus of Control Scale and the self-report reward preferences (in Chinese) scale was administered by the class teacher at each school. Questionnaires were completed in approximately 20 minutes.

Results

Reliability Analysis of the Reward Preference Survey

The reliability of the reward preference survey was assessed using the alpha model in the SPSS computer program. The reliability coefficient alpha for the 6 items of the performance subtest was .71, with a standardized item alpha of .72; the reliability coefficient alpha for the 6 items of the competition subtest was .73, with a standardized item alpha of .74; and the reliability coefficient alpha for the 6 items of

the chance subtest was .60, with a standardized item alpha of .62. In total, the reliability coefficient alpha for the 18 items with a sample size of 288 was .64, with a standardized item alpha of .65.

Factor Analysis of the Reward Preference Survey

The factor analysis of the reward preference survey was derived from component analysis (Hair, Anderson, Tatham, & Black, 1998). Positively phrased question data were combined with negatively phrased question data for each variable. For instance, the score of Question 9, "You find it satisfying when teachers decide who gets a prize by choosing names at random," and the score of Question 6, "You dislike a reward system which is based on luck," were added up as one score. In total, there were nine variables, that is, three types of rewards (competition, performance, chance) by three dimensions (effectiveness, motivation, satisfaction) analyzed.

In addition, in terms of data quality, the results of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .69) and Bartlett's Test of Sphericity (approximate chi-square = 659.761, df = 36, p = .000) suggested that the data may be grouped into a smaller set of underlying factors and the correlations are appropriate for factor analysis. The results of the extraction of component factors based on the initial computation showed that there were three significant interpretable factors having eigenvalues greater than 1. Table 1 shows the three factors extracted through the principle components analysis. Table 2 contains the information regarding their relative explanatory power as expressed by their eigenvalues (i.e., extraction sums of squared loadings for a factor; Hair et al., 1998).

In summary, the results of the factor analysis confirmed that the test items were grouped into three factors: competition rewards, performance rewards, and chance rewards as the research intended.

Significant Group Differences

The significant differences between groups were measured by multivariate tests. The scores on the three types of rewards were dependent variables. Ability and locus of control were treated as two between-subject independent factors. It was analyzed as a 2 (gifted, nongifted)

Table 1

The Results of the Factor Analysis—Structure Matrix (*N* = 288)

Variables	Rescaled Components			Communalities
	1	2	3	
Competition Reward / effectiveness	.29	-.14	**.78**	.62
Competition Reward / motivation	.46	-.09	**.81**	.73
Competition Reward / satisfaction	.01	-.18	**.82**	.72
Performance Reward / effectiveness	**.81**	-.10	.33	.68
Performance Reward / motivation	**.85**	-.10	.30	.74
Performance Reward / satisfaction	**.75**	.05	.06	.58
Chance Reward / effectiveness	-.02	**.80**	-.08	.64
Chance Reward / motivation	-.03	**.79**	-.10	.62
Chance Reward / satisfaction	-.05	**.72**	-.21	.52

Note. Extraction method: Principal Component Analysis. Rotation method: Oblimin with Kaiser Normalization.

Table 2

Components and Relative Explanatory Power

Component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	3.06	30.60	30.60
2	1.96	19.60	50.20
3	1.49	14.87	65.07

Note. Extraction method: Principal Component Analysis.

x 3 (internal, moderate, external) design, with the test criterion being Pillai's Trace.

The results of the present study suggested that the students' preferences for the three types of rewards were affected significantly by their ability, $F(3, 280) = 3.67$, $p = .01$, Effect size = .04; locus of control, $F(6, 562) = 4.24$, $p = .00$, Effect size = .04; and the interaction between ability and locus of control, $F(6, 562) = 2.21$, $p = .04$, Effect size = .02.

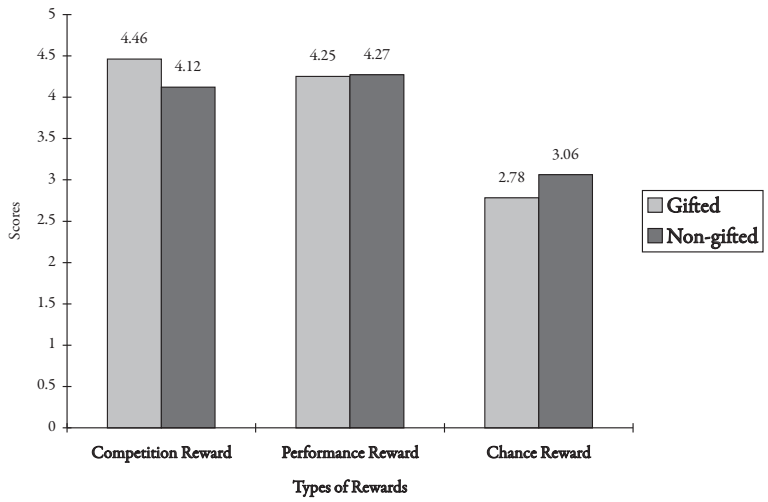

Figure 1. The effect of ability on reward preference.

The findings showed that while the gifted students tended to evaluate competition rewards significantly higher than the non-gifted students, and the nongifted students tended to evaluate chance rewards significantly higher than the gifted students, there was no significant difference between the gifted and nongifted students in their evaluation of performance rewards (see Table 3 and Figure 1).

In terms of locus of control, the internal students tended to prefer competition and performance rewards the most, that is, significantly more often than the moderate and external students. But there were no significantly different mean scores among the three groups in preferring chance reward (see Table 3 and Figure 2).

Analysis of the interaction between ability and locus of control showed a significant effect for chance reward; Table 3 and Figure 3 show that the nongifted/moderate and nongifted/external students preferred chance rewards more often than the other groups. There was no ability by locus of control interaction detected for competition or performance rewards.

Table 3

The Results of Between-Groups Effects (*N* = 288)

Dependent Variables	Mean and Standard Deviation												*F* value	*Df*	Error *Df*	*p*	Partial Eta Squared
Ability													3.67	3	280	.01**	.04
	Gifted						Nongifted										
	Mean		*SD*				Mean		*SD*								
Competition	4.46		0.08				4.12		0.12				6.09	1	282	.01**	.02
Performance	4.25		0.07				4.27		0.11				.03	1	282	.86	.00
Chance	2.78		0.07				3.06		0.11				4.87	1	282	.03*	.02
LOC													4.24	6	562	.00***	.04
	Internal				Moderate				External								
	Mean		*SD*		Mean		*SD*		Mean		*SD*						
Competition	4.67		0.15		4.22		0.06		3.98		0.12		6.13	2	282	.00***	.04
Performance	4.75		0.15		4.16		0.06		3.88		0.12		10.28	2	282	.00***	.07
Chance	2.80		0.14		2.99		0.06		2.97		0.11		.77	2	282	.47	.01
Ability x LOC													2.21	6	562	.04*	.02
	Gifted						Nongifted										
	Internal		Moderate		External		Internal		Moderate		External						
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*					
Competition	4.67	.16	4.44	.08	4.27	.14	4.67	.26	4.00	.09	3.70	.20	1.10	2	282	.33	.01
Performance	4.53	.16	4.16	.08	4.05	.14	4.97	.26	4.15	.09	3.70	.20	2.15	2	282	.12	.02
Chance	2.90	.15	2.65	.07	2.78	.13	2.70	.24	3.33	.09	3.16	.19	4.34	2	282	.01**	.03

Note. *Df* = degrees of freedom. *p < .05. **p < .01. ***p < .001.

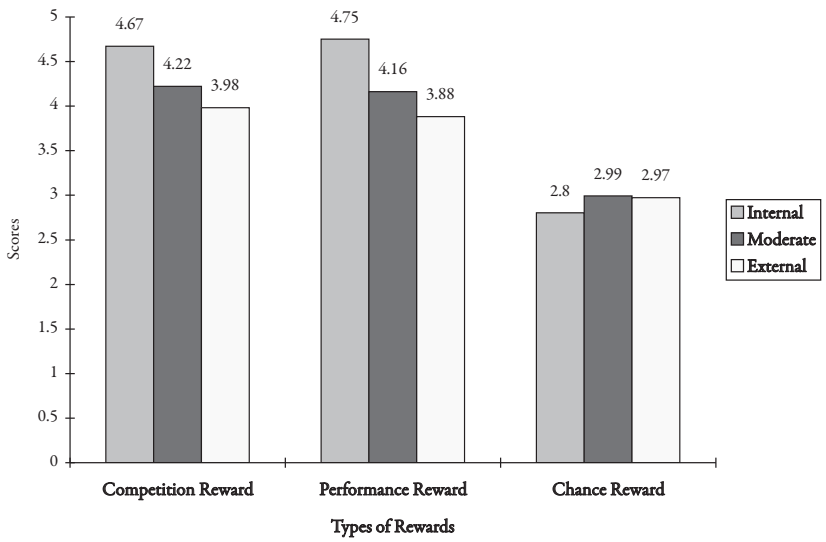

Figure 2. The effect of locus of control on students' preferences for rewards.

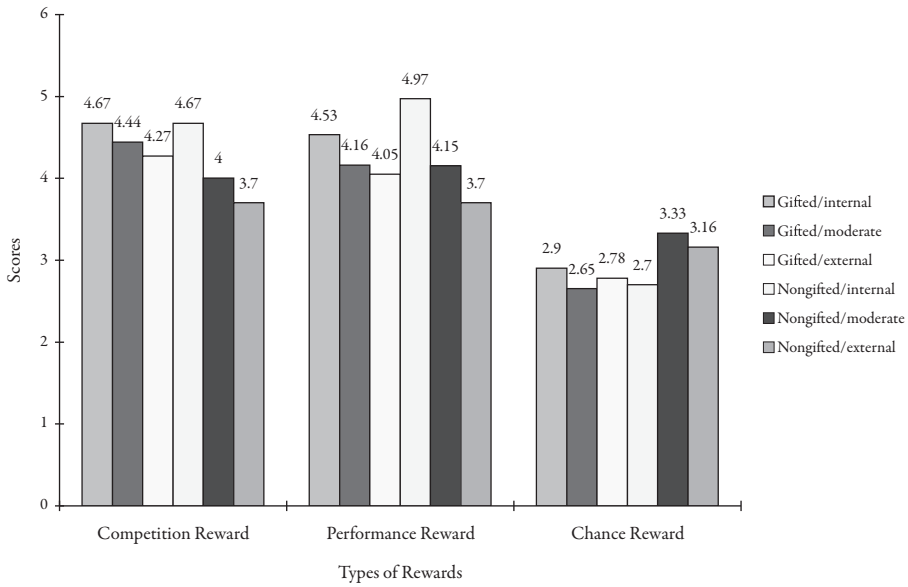

Figure 3. The interaction effect between ability and locus of control on reward preference.

Discussion

The results of the survey suggested that ability, locus of control, and the interaction of ability and locus of control significantly affected the students' preferences for the three types of rewards.

In terms of ability, the findings suggested that, in general, gifted students most preferred competition rewards and least preferred chance rewards. The preference for performance rewards fell between these two. In contrast, nongifted students most preferred performance rewards and least preferred chance rewards. The preference for competition rewards fell between these two. Although both the gifted and nongifted students have a lower preference for the chance rewards than the other two types of rewards, the results showed that the nongifted have a higher evaluation than the gifted for the chance rewards. These differences between the gifted and nongifted students were statistical significant; the gifted students more strongly preferred competition rewards when compared to the nongifted students, and the nongifted students more strongly preferred chance rewards when compared to the gifted students. However, there was no significant difference between gifted students and nongifted students in their evaluation of performance rewards. These findings seemed to be consistent with the previous research of Powers and Douglas (1983). They suggested that academically gifted students considered effort a more important determinant of achievement than ability, context, or luck. Competition rewards were considered a type of reward that required the most effort. Moreover, this study's findings were also supported by Winefield et al. (1984) who indicated that higher IQ students tended to prefer contingent rewards more than lower IQ students.

In terms of locus of control, the results also suggested that students' locus of control significantly affected their evaluation of the three different types of rewards. The results showed that the internal students preferred competition and performance rewards significantly more strongly than the moderate and external students. There were no significantly different mean preference scores for chance rewards among the three groups.

Rotter (1966) suggested that individuals with an internal locus of control would place greater value on contingent achievement-related

rewards. In the present study, the pattern of relationship between locus of control and contingent rewards was as Rotter predicted: the higher the internality, the higher the students' preferences for contingent rewards (competition and performance rewards). The positive relationship between contingent rewards and internal locus of control was significant. One of the interesting findings was that this kind of relationship did not appear in noncontingent chance rewards. In other words, students did not evaluate chance rewards significantly higher because of their externality. These intriguing results contradict logical predictions from Rotter's locus of control construct in relation to reward contingency because individuals with external loci of control tended to evaluate noncontingent rewards significantly higher than those with internal locus of control.

The interaction between ability and locus of control was significant for chance rewards, with the nongifted/moderate and nongifted/external students preferring chance rewards more than the other groups. There was no ability by locus of control interaction detected for preferring competition or performance rewards. These findings suggested that any important relative preference for chance rewards was restricted to nongifted students of moderate to external locus of control. Putting it another way, although all groups of students preferred contingent to noncontingent rewards in general and while internal locus of control groups preferred them more strongly than the others, the nongifted students of moderate to external locus of control were relatively more attracted than the rest to the noncontingent rewards. These findings are consistent with Rotter's (1966) results and support his general proposal that individuals with an internal locus of control place greater value on contingent achievement-related rewards.

In summary, the findings of the present research suggest that (a) the gifted students tended to evaluate competition rewards significantly higher when compared to the nongifted students, the nongifted students tended to evaluate chance rewards significantly higher when compared to the gifted students, and there was no significant difference between the gifted and nongifted students in their evaluation of performance rewards; (b) the nongifted students with moderate to strong externality tended to prefer chance rewards more than the gifted students and the internal nongifted students.

However, students did not show any interaction effect on the competition or performance reward conditions. The outcomes of this research supported the hypothesis that there would be an interaction between ability and locus of control in students' preferences for different types of rewards. Academic ability, locus of control, and their interaction affected student's evaluation of three types of rewards, indicating that these factors should be taken into consideration when extrinsic incentives are used.

References

Carlson, N. R. (1993). *Psychology: The science of behavior*. Needham Heights, MA: Allyn & Bacon.

Findley, M. J., & Cooper, H. M. (1983). Locus of control and academic achievement: A literature review. *Journal of Personality and Social Psychology, 44,* 419–427.

Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice-Hall International.

Kalechstein, A., & Nowicki, S., Jr. (1997). A meta-analytic examination of the relationship between control expectancies and academic achievement: An 11-year follow-up to Findley and Cooper. *Genetic, Social, and General Psychology Monographs, 123,* 29–56.

Klein, S. B., & Mowrer, R. R. (Eds.). (1989). *Contemporary learning theories: Instrumental conditioning theory and the impact of biological constraints on learning*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Krampen, G., & Wieberg, H.-J. W. (1981). Three aspects of locus of control in German, American, and Japanese university students. *The Journal of Social Psychology, 113,* 133–134.

Kren, L. (1992). The moderating effects of locus of control on performance incentives and participation. *Human Relations, 42,* 991–1012.

Laffoon, K. S., Jenkins-Friedman, R., & Tollefson, N. (1989). Causal attributions of underachieving gifted, achieving gifted, and nongifted students. *Journal for the Education of the Gifted, 13,* 4–21.

Lu, S. C. Wu. (2005). The interaction between academic ability, locus of control and reward contingency. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 65*(7–A), 2478.

McClelland, R., Yewchuk, C., & Mulcahy, R. (1991). Locus of control in underachieving and achieving gifted students. *Journal for the Education of the Gifted, 14,* 380–392.

Moran, J. D., & Lion, E. Y. (1982). Effects of reward on creativity in college students of two levels of ability. *Perceptual & Motor Skills, 54,* 43–48.

Nowicki, S., Jr., & Strickland, B. R. (1973). A locus of control scale for children. *Journal of Consulting and Clinical Psychology, 40,* 148–154.

Powers, S., & Douglas, P. (1983). Attributions for success and failure of academically gifted high school students. *Psychological Reports, 53,* 597–598.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80*(1, Whole No. 609).

Ryan, R. M., Mims, V., & Koestner, R. (1983). Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of Personality and Social Psychology, 45,* 736–750.

Skinner, B. F. (1974). *About behaviorism*. New York: Knopf.

Thorndike, E. L. (1905). *The elements of psychology*. New York: Seiler.

Trusty, M. L., & Macan, T. H. (1995). Personal control: Effects of reward contingency and locus of control. *Journal of Social Behavior & Personality, 10,* 201–214.

Van Boxtel, H. W., & Mönks, F. J. (1992). General, social, and academic self-concepts of gifted adolescents. *Journal of Youth and Adolescence, 21,* 169–186.

Winefield, A. H., Barnett, J. A., & Tiggemann, M. (1984). Learned helplessness and IQ differences. *Personality & Individual Differences, 5,* 493–500.

Wolf, M. M. (1978). Social validity: The case for subjective measurement on how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis, 11,* 203–214.