

The Relationships between Achievement Motivation and the Spontaneous Learning of a Ball Juggling Task

Tamotsu NISHIDA*

This study was aimed at testing the hypothesis that those who have high need for achievement (High n Ach group) would show higher performance in the spontaneous learning of a ball juggling task than those who have low need for achievement (Low n Ach group).

Mehrabian Measure of Achieving Tendency was used to classify the subjects into High and Low n Ach groups. All subjects were given the juggling task with three tennis balls and were tested on how many catches they could juggle on one week later.

The High n Ach group showed significantly high scores on the task motivation scale than the Low n Ach group ($p < .05$). Both High and Low n Ach groups showed significant increase in performance during one week ($p < .01$). However, there was no difference between the High and Low n Ach groups concerning other dependent variables in the process of the learning. These results did not support the hypothesis. Some reasons for the inconsistency were discussed.

Achievement motivation may be assumed to be one of the principal prerequisites for motor skill learning. Lockhart¹³⁾ stated that two things, capability and motivation, were necessary to motor learning.

Intense research on the nature of achievement motivation began with the efforts of McClelland et al¹⁴⁾ in 1953, and much of this work has been furthered by his associates and followers. A great number of previous researches on achievement motivation were presented and summarized by Atkinson,^{1,2,3)} Atkinson and Raynor,⁵⁾ Atkinson and Feather,⁴⁾ Fyans,⁶⁾ Hayashi and Yamauchi,⁹⁾ Heckhausen,¹⁰⁾ Miyamoto,¹⁶⁾ and Nishida.^{17,18,20)} Most of these researches have been concerned with measurement, origin, risk-taking behavior, performance, persistence, and causal attribution.

Concerning achievement motivation, a little attention has been directed toward investigation of motor skill learning. Burton⁷⁾ reported that there was no relationship between achievement motiva-

tion and skill attainment in riflery ($r = .09$) and a negative relationship between achievement motivation and bowling skill ($r = -.32$). Smith and Johnson²¹⁾ obtained a significant relationship between achievement motivation and learning to type for adolescents ($r = .30$) but not for adults ($r = .19$). Nishida¹⁹⁾ showed that individuals designated as high need-achievers were superior on the early learning of a rotary pursuit tracking. A review of these researches could not lead to consistency. It is considered that there are some important questions concerning the inconsistency.

One is the question of whether the subjects learn the motor skills spontaneously or not. In most of the previous researches mentioned above, the tasks were usually given by the experimenters and the subjects were required to complete them under compulsion. In these cases, it seems that the subjects are constrained to perform the task in the experimental room even though they do not have the spontaneous need to achieve it. Therefore, it

* Research Center of Health, Physical Fitness and Sports, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464.

will be necessary to set up the experimental condition so that the spontaneous need will be directly concerned with activities and behaviors. A theory of achievement motivation applies to behavior when an individual knows that his performance will be evaluated in terms of some standard of excellence, and when his activities are spontaneous and positive. As viewed from the general construct of achievement motivation,³⁾ it could be predicted that behavioral and cognitive differences between high and low need-achievers would be clear in the case of spontaneous activities or learning.

Another question is concerned with the dependent variables taken in the previous researches. They were based on the results of performance or behavioral consequences (product-oriented) and did not include subjects' internal changes in the process of motor skill learning (process-oriented).

In this study, the spontaneous learning is based on spontaneous activities or intrinsic motivation, but the choice of the learning task is determined by an experimenter. It was hypothesized that those who have high need for achievement would show higher performance in the spontaneous learning of a ball juggling task than those who have low need for achievement. To test this hypothesis, the following dependent variables in the process of the learning were taken for each subject: (1) task motivation; (2) performance (number of consecutive ball catches); (3) practice days; (4) practice time in min.; (5) maximum consecutive catches during practice; and (6) attitude toward the task during practice.

METHOD

Subjects and Measuring Achievement Motivation

The subjects were 34 male undergraduate students ranging in age from 18 to 20 yr., with the mean age of 19.5 yr. These subjects were screened

from a total sample of 175 male undergraduates on the basis of their responses to a 26-item questionnaire of achievement motivation.

To classify the subjects into high and low need-achievement groups, the Mehrabian Measure of Achieving Tendency (MMAT; Mehrabian)¹⁵⁾ was used. MMAT was translated into Japanese and administered 2 weeks before the experiment. Mean and standard deviation of MMAT scores for 17 high need-achievement subjects (High n Ach group) were 26.59, 8.58 and those for 17 low need-achievement subjects (Low n Ach group) were -19.41, 7.87, respectively.

Motor Task

A juggling task with three tennis balls (Knapp and Dixon)^{11,12)} was selected and employed as a learning task in this study. All subjects had no previous experience in this task. A schematic presentation of the ball juggling task is shown in Fig. 1.

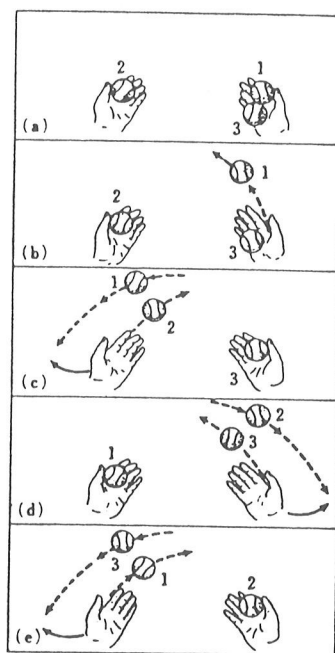


Figure 1. A schematic presentation of a ball juggling task.

Experimental Treatment

The experiment was pursued in accordance with the following treatment.

(1) Suggestions and several demonstrations of the juggling were presented until each subject felt he fully understood how to proceed with the task.

(2) All subjects were instructed to practice the juggling for 5 minutes.

(3) Task motivation of a 10-item questionnaire was administered in the form of Lickert type 5-point scale. It includes desire, interest, will, and need for good achievement on the juggling task.

(4) The subjects were given three pre-test trials. The number of consecutive catches made in each trial were recorded as performance scores.

(5) The following instruction were given: "Post-test trials of the juggling task will be held one week later. You had better practice very hard at home in

order to get high performance scores on this task. But, the amount of practicing you do is up to you."

(6) After these instructions, the subjects received a check list concerning practice time in minutes and maximum consecutive catches for each day. They were instructed to fill in the check list if they had time to practice the juggling spontaneously.

(7) One week later, the subjects were given three post-test trials to be tested as to how many catches they could juggle. The number of consecutive catches for each trial was recorded.

(8) It was required that the subjects answer a 10-item questionnaire concerning attitude toward the task during practice such as goal setting, instrumental activity, etc.

Table 1. Median scores and total ranks on several dependent variables for the High and Low n Ach groups and results of the Mann-Whitney U test.

Dependent variables	High n Ach group (N=17)		Low n Ach group (N=17)		Mann-Whitney U test
	Mdn.	Total ranks	Mdn.	Total ranks	
1. Task Motivation	36.5	228.5	29.5	366.5	U= 75.5 P<.05
2. Performance					
(pre-test trials)	5.3	281.5	4.5	313.5	U=128.5
(post-test trials)	20.5	329.5	24.0	265.5	U=112.5
(performance change ^a)	7.0	340.0	19.0	255.0	U=102.0
(performance change/ practice days)	1.4	344.0	4.5	251.0	U= 98.0
(performance change/ practice time in min.)	0.16	332.5	0.3	262.5	U=109.5
3. Practice					
(days)	5.0	332.0	5.2	263.0	U=110.0
(time in min.)	35.5	349.5	75.0	245.5	U= 92.5
(time in min./days)	8.75	331.5	13.25	263.5	U=110.5
(maximum consecutive catches)	10.0	324.0	13.0	271.0	U=118.0
4. Attitude toward the task during practice	32.5	310.5	34.5	284.5	U=131.5

^a(post-test trials) - (pre-test trials)

RESULTS

Several dependent variables were measured for each subject. Means and standard deviations on these measurements for the High and Low n Ach groups were calculated. Most of these measurements, however, did not show normal distribution and had no equal variance between High and Low n Ach groups. Therefore, a nonparametric test⁸⁾ was applied to these data for testing the differences between the two groups. Median scores, total ranks on several dependent variables for the High and Low n Ach groups and results of the Mann-Whitney U test are presented in Table 1.

Task Motivation

The High n Ach group showed higher total scores on the questionnaire than the Low n Ach group did. The difference between the two groups was statistically significant at a 0.05 level.

Performance

As predicted, total consecutive catches of the three pre-test trials for the High n Ach group were relatively higher than for the Low n Ach group. The Low n Ach group showed higher scores than the High n Ach group did concerning total consecutive catches of the three post-test trials, increases in performance between the pre and post-test trials, increases in performance per practice days, and increases in performance per total practice time. These performance differences between the High and Low n Ach groups, however, were not statistically significant at a 0.05 level.

To examine statistically whether or not the number of consecutive catches increased between pre and post-test trials, the Wilcoxon T test was used. Both High and Low n Ach groups showed significant increased in performance at a 0.01 level (Table 2).

Practice

The Low n Ach group showed a tendency toward relatively higher scores on practice days and total practice time in a one week interval, practice time per day, and maximum consecutive catches during practice than the High n Ach group. These differences between the two groups, however, were not statistically significant at a 0.05 level.

Attitude toward the Task during Practice

Although total attitude scores during the one week practice were relatively higher for the Low n Ach group in comparison with the High n Ach group, the difference was not significant at a 0.05 level.

Table 2. Median scores on total consecutive catches in three trials for High and Low n Ach groups and comparison between the pre-test and post-test trials.

Group	Pre-test trials Mdn.	Post-test trials Mdn.	Wilcoxon T test
High n Ach (N=17)	5.3	20.5	T=1.5 P<.01
Low n Ach (N=17)	4.5	24.0	T=0 P<.01

DISCUSSION

MMAT used in this study to classify the subjects into High and Low n Ach groups was considered as a scale to assess a relatively stable disposition to strive for achievement or success. Therefore, it is expected that the subjects in the High n Ach group chosen from the total sample of male undergraduates on the basis of MMAT scores, might have higher achievement motivation for all of the tasks in achievement-oriented situations than those in the Low n Ach group. To test this hypothesis, a 10-item questionnaire of task motivation was administered to the two

groups. As predicted, the High n Ach group showed significantly higher scores on task motivation scale than the Low n Ach group. It is considered that the High n Ach group in this study had a strong achievement motivation for the juggling task in comparison with the Low n Ach group.

However, concerning performance, practice and attitude toward the task during practice, the Low n Ach group demonstrated relatively higher median scores than the High n Ach group, though there were no significant differences between the two groups. These results did not support the hypothesis that the High n Ach group would show higher performance in the spontaneous learning of a ball juggling task than the Low n Ach group. These results also did not concur with a previous research reported by Nishida¹⁹⁾ in which the High n Ach group had greater effects on the early learning of a rotary pursuit tracking.

Why did the inconsistency occur? One reason for it may be attributed to the attractiveness or incentive value of the juggling task used in this study. Knapp and Dixon¹¹⁾ suggested that juggling or ball-tossing was a favorite and interesting task for the subjects. If so, even the subjects in the Low n Ach group who would be prone to fear of failure or avoidance of achievement-oriented situations might practice the juggling very hard because of its attractiveness. From these considerations, it appears that the attractiveness or incentive value would reduce the differences in behavior between the High and Low n Ach groups, which were affected by the need for achievement which the subjects naturally had.

Another reason may be connected with a organization of daily life activities. According to McClelland et al,¹⁴⁾ those who have high need for achievement are involved in attainment of a long-term achievement goal. Being a success in life, becoming a doctor, lawyer, successful business-

man, and so forth, will be examples of career involvement. From these statements, it is suggested that high need-achievers have sub goals of long-term achievement in their daily life and their daily life activities are firmly organized to achieve the sub goals. In other words, it seems that the subjects in the High n Ach group decide on these sub goals by themselves and spend more time in striving for them in their daily life activities than those in the Low n Ach group. Perhaps such sub goals will be based on the value systems of their lives. Therefore, it is considered that the subjects in the High n Ach group would not have enough time to practice the juggling task because the value of the task which was temporarily given by an experimenter into their organized daily life activities should be relatively low in their stable value systems.

This study was aimed at testing the hypothesis that the High n Ach group would show higher performance in the spontaneous learning of a ball juggling task than the Low n Ach group. It was also expected that the subjects could practice the juggling task spontaneously and with intrinsic motivation. The subjects, however, may be partially constrained to practice the juggling by the instruction given to them that post-test trials would be held one week later. They were also required to fill in the check list concerning practice time and maximum cosecutive catches for each day if they had time to practice the juggling spontaneously. It seems that these experimental treatments may constrain the subjects' spontaneous learning to some degrees. If the choice of a learning task was determined completely by the subjects, the High n Ach group could show higher performance in the learning than the Low n Ach group.

These considerations may be concerned with task motivation during practice. In this study, the task motivation questionnaire was administered

only before the pre-test trials. If the questionnaire was administered to the subjects during the juggling practice periods, these considerations mentioned above might be clear and comprehensive.

The author would like to express his appreciation to Dr. K. Inomata for his valuable comments and suggestions.

REFERENCES

- 1) Atkinson, J.W., "Motivational determinants of risk-taking behavior," *Psychological Review*, **64-6** : 359—372, 1957.
- 2) Atkinson, J.W., *Motives in fantasy, action, and society*, Van Nostrand Co.: New York, 1958.
- 3) Atkinson, J.W., *An introduction to motivation*, Van Nostrand Co.: New York, 1964.
- 4) Atkinson, J.W. and Feather, N.T., *A theory of achievement motivation*, John Wiley and Sons, Inc.: New York, 1966.
- 5) Atkinson, J.W. and Raynor, J.O., *Motivation and achievement*, Winston and Sons, Inc.: Washington, 1974.
- 6) Fyans, L.J. (Ed.), *Achievement motivation*, Plenum Press: New York, 1980.
- 7) Burton, E.C., "State and trait anxiety, achievement motivation and skill attainment in college women," *Research Quarterly*, **42-2** : 139—144, 1971.
- 8) Daniel, W.W., *Applied nonparametric statistics*, Houghton Mifflin Co.: Boston, 1978.
- 9) Hayashi, T. and Yamauchi, H., *The study of achievement motivation (Japanese)*, Seishin-Shobo: Tokyo, 1978.
- 10) Heckhausen, H., *The anatomy of achievement motivation*, Academic Press; New York, 1967.
- 11) Knapp, C.G. and Dixon, W.R., "Learning to juggle: I. a study to determine the effect of two different distributions of practice on learning efficiency," *Research Quarterly*, **21** : 331—336, 1950.
- 12) Knapp, C.G. and Dixon, W.R., "Learning to juggle: II. a study of whole and part methods," *Research Quarterly*, **23** : 398—401, 1952.
- 13) Lockhart, A., "Prerequisites to motor learning," *Academy Papers*, **1** : 1—13, 1968.
- 14) McClelland, D.C., Atkinson, J.W., Clark, R.A., and Lowell, E.L., *The achievement motive*, Appleton-Century-Crofts, Inc., 1953.
- 15) Mehrabian, A., "Measures of achieving tendency," *Educational and Psychological Measurement*, **29** : 445—451, 1969.
- 16) Miyamoto, M. (Ed.), *The psychology of achievement motivation (Japanese)*, Kaneko-shobo: Tokyo, 1979.
- 17) Nishida, T., "Effects of achievement motivation on motor performance in competitive conditions (Japanese)," *Japanese Journal of Physical Education*, **23-1** : 13—23, 1978.
- 18) Nishida, T., "A study on persistence in failure situations: concerning achievement motivation and causal attributions (Japanese)," *Nagoya Journal of Health, Physical Fitness and Sports*, **5-1** : 59—66, 1982.
- 19) Nishida, T., "The effects of achievement motivation on the early learning of a rotary pursuit tracking (Japanese)," *The 46th Meeting of the Japanese Psychological Association*, **215**, 1982.
- 20) Nishida, T. and Inomata, K., "A factor analytical study on achievement motives in sports (Japanese)," *Japanese Journal of Physical Education*, **26-2** : 101—110, 1981.
- 21) Smith, M. and Johnson, I., "Achievement motivation and indirect testing for manual skills," *Perceptual and Motor Skills*, **54** : 63—66, 1982.

(Received December 27, 1982)