The effects of competition and noncompetition on performance of a motor task[1]

RICHARD D. PETRE AND CHARLES GALLOWAY
UNIVERSITY OF KANSAS MEDICAL CENTER

Three male adults participated in a study of the effects of competition on a complex motor skill which had been acquired to a high level of proficiency. Each S served as his own control under a noncompetition condition and then competed with each of the other two Ss. A very significant ($p < .001$) performance decrement occurred; however, certain factors other than competition could be partially responsible.

The introduction of a social-competitive condition to alter the "motivational" state of Ss has been a fairly common practice (Noble, Fuches, & Robel, 1958; Williams, 1956); however, the effects of such a procedure on motor performance have generally been inconclusive (Bilodeau & Bilodeau, 1961). The present interest was in the effects of the introduction of individual competition after a motor skill had been acquired to a nearly asymptotic level.

Method

The Ss were three adult males, two of which included the authors, who already had considerable experience with the apparatus.

The apparatus included an Aurora HO scale, slot-car set. The set consisted of a two-car, figure-eight track approximately 120 in. in length. The cars were controlled by push-button, variable resistors which had an excursion of 7 mm from stop to maximum speed. Microswitches, relays, counters and a timer were included to record laps completed and to control the duration the tracks were powered. The tracks were powered from two independent power supplies so a current drain on one track would not affect the voltage available to the other.

The experimental design consisted of two conditions: four 2-min. periods of operating a car to establish a performance baseline under a noncompetition condition, and four 2-min. periods of racing one of the other two Ss with the same car-track combination which was used under the noncompetition condition. This two-phase procedure was replicated with each of the four possible car-track combinations and with each of the other two Ss as competitors. Instructions to the Ss were to do as well as they could under both conditions. Each S had to put his own car back on the track whenever it went off and when an S's car went off the track, the opponent could lap him only once. For each S there was a total of 32 2-min. periods under the noncompetition condition and 32 2-min. periods under the competition condition. There was a rest period of approximately 1 min. between each of the four 2-min. performance periods of a given condition. The total duration of the study was approximately two weeks.

The counters and timer were available for observation by Ss during both conditions, making knowledge of performance always available.

Results and Discussion

The results are presented in Fig. 1. Each point represents the mean of eight scores which are the four car-track combinations with each of the other two Ss as opponents. The data were plotted by 2-min. trials so performance changes which might be a function of practice could be observed. A subjects by trials by competition conditions analysis of variance was done with the Fig. 1 data. Significant results were obtained for Ss

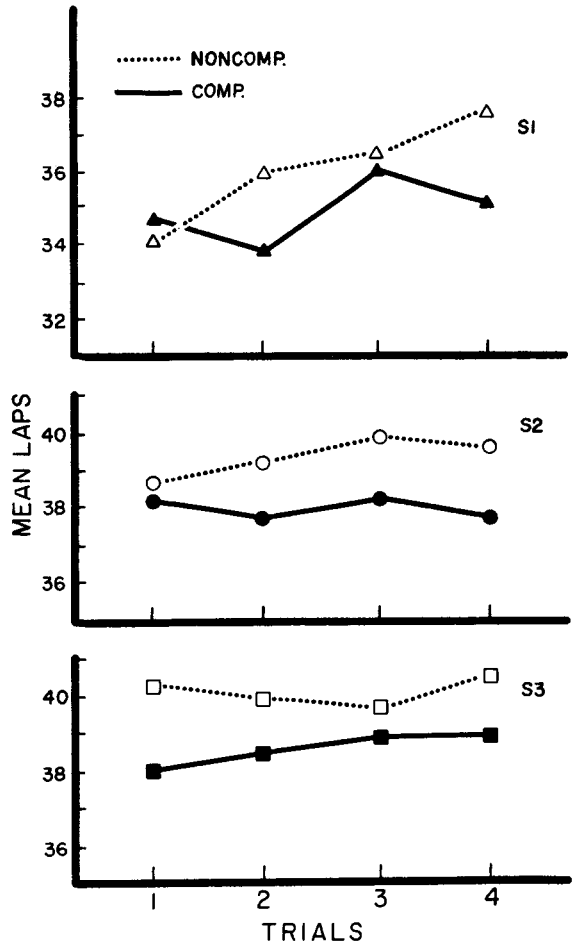

Fig. 1. Mean laps completed by each S under the competition and noncompetition conditions for successive 2 min. trials. Each mean is based on eight scores; each of the four car-track combinations with each of the two other Ss.

($F = 75.62$, $df = 2/168$, $p < .001$) and for competition condition ($F = 379.68$, $df = 1/6$, $p < .001$), in favor of the noncompetition condition. The very large F for competition condition was a result of a very small subjects by competition-conditions interaction which was used as the error term for the F ratio. There was no significant change in performance as a function of trials ($F = 2.10$, $df = 3/6$, $p > .10$) although S-1 appears to have improved under the noncompetition condition. There was no evidence of improved performance with practice under the competition condition.

Because of the rule that one S can lap his opponent's car only once if it goes off the track, and the possibility of accidents on the part of one S interfering with the other S's performance, the observed decrement could be primarily the result of physical interference by the opponent's car. If this were the case, it would be expected that two opponents' performance would be correlated. In order to partially separate the effects of external interference from poorer individual performance, Spearman rank-order correlations were computed for each pair of Ss for their 16 2-min. racing periods. The results were as follows: S-1 vs. S-2, $r = .63$, $p < .005$; S-1 vs. S-3, $r = .21$, $p > .05$; S-2 vs. S-3, $r = .31$, $p > .05$. Except for the races between S-1 and S-2, scores of one S, under the competition condition, were independent of the scores of his competitor for corresponding races.

The introduction of a competition condition had a very marked decremental effect on slot-car operation. Operating slot-cars at high speed is a fairly difficult task and an optimal performance requires a very precise timing of the operation of the potentiometer in relation to the position of the car on the track. The effect of competition was related to several factors. The factor which appeared to account for most of the decrement was the increased frequency with which cars went off the track due to excessive speed. A second factor was the occurrence of an accident by one S which blocked the track and caused his opponent to stop. The nonsignificant correlations would seem to support the greater importance of the first factor for S-1 vs. S-3 and S-2 vs. S-3.

References

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Note

1. This research was supported by research grant HD 00870-03 from the National Institute of Child Health and Human Development to the University of Kansas, Bureau of Child Research.