The effects of combined physical and mental practice procedures and task difficulty on tonal pattern accuracy
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Aim and objectives
The study aimed to investigate the relative effectiveness of different time proportions spent on physical and mental practice, on the performance of a tonal pattern over two chord progressions. The objectives were to find whether there were differences between groups using different proportions of physical practice (PP) and mental practice (MP), and whether an interaction existed between practice groups and difficulty of progressions.

Context
MP studies related to music performance tasks have been limited to learning and memorizing music for performance (Coffman, 1987; Lim & Lippman, 1991; Rosenthal, Wilson, Evans, & Greenwalt, 1988; Ross, 1985; Rubin-Rabson, 1941; Theiler & Lippman, 1995). Performance of tonal patterns in relation to chord sequences, as used in improvisation methodology, may also be used for MP study.

Two variables that MP studies have not specifically addressed include task difficulty and comparisons of combinations of PP and MP. As part of a post hoc analysis, Rubin-Rabson (1941) found a nonsignificant tendency toward superiority of combined PP and MP for easy and medium pieces, whereas for difficult pieces PP was most effective. Comparisons between different combinations of PP and MP have been done in a non-music related study by Hird, Landers, Thomas, and Horan (1991). They found a linear trend in which as the relative proportion of PP increased, so was performance enhanced.
Methodology

Sixty undergraduate students who had participated in an improvisation course were assigned to one of four practice groups. Each subject practiced for 3 min. according to the prescribed practice procedure of the group which included: (a) PP, (b) MP, (c) alternating half a minute of MP and one minute of PP (66%PP:33%MP), and (d) alternating one minute of MP and half a minute of PP (33%PP:66%MP). All subjects performed a pretest prior to the practice routine followed by a posttest. This was done for both excerpts, order of which was randomly assigned.

The tonal pattern consisted of chord tones performed as eighth notes in the order of 3-1-7-5. The two chord progressions were 16 bar excerpts of standard tunes. Note errors were independently scored by two judges. Intejudge reliability was \( r = .92 \). Test reliability was \( r = .75 \) for the easy progression and \( r = .91 \) for the hard progression.

Results

Distribution curves of the dependent variables were found to be positively skewed. Normalization was achieved using the logarithmic transformation formula \( X' = \log(X + 1) \) on both pre- and posttest results (Winer, 1971).

A 4 X 2 (Practice Group X Task Level Posttest) ANCOVA with repeated measures on the last factor, using pretest results of each task as a covariate was performed. Results revealed a significant main effect for the task level factor, \( F(1,54) = 6.61, p < .013 \), indicating an actual difference in difficulty level. A significant interaction effect was found between practice group and task difficulty, \( F(3,54) = 3.65, p < .018 \). No significant main effect was found for the practice group factor \( F(3,54) = 2.30 \).

A paired sample t-test showed that task level effect was significant for both the 33%PP:66%MP, \( t(14) = -3.65 \), and MP, \( t(14) = -3.53 \), groups at the \( p = .003 \) level. These groups performed on the easy progression significantly better than on the hard progression (figure 1).

Figure 1. Adjusted posttest means as a function of practice groups by task.
Since there was a similarity between results of the adjusted postest means of the MP and the 33%PP:66%MP groups as well as between the PP and the 66%PP:33%MP groups, a comparison of the combined adjusted scores of each of the two groups on the two tasks was conducted. The four practice groups were collapsed into two practice groups: (a) PP and 66%PP:33%MP, both high in percentage of PP (HPP), and (b) MP and 33%PP:66%MP, both high in percentage of MP (HMP). The t-test analysis of the adjusted means of these groups on each task revealed significant differences on the hard task, \( t(58) = -2.30 \), at the \( p = .02 \) level. This finding indicated that performance of the HPP group on the hard task was significantly superior to that of the HMP group.

Key contribution

The key contribution of this study is the result of significant interaction between task difficulty and practice group. This finding indicates that effectiveness of MP or combined MP and PP is dependent on both difficulty of task and the relative proportions of MP and PP. This result may explain conflicting findings of MP studies. For example, Ross (1985) found significant differences between MP and combined PP and MP with a ratio of 66% PP. However, Coffman (1987) and Theiler and Lippman (1995) found no significant differences when compared with a smaller ratio of 50% PP. This in addition to tasks of undefined difficulty may partially explain the conflicting results.

References


