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ABSTRACT

A study examined chess expertise in 113 children in grades 1-12 who played competitive chess. Specific attention was given to the relationship between experience, as measured by number of games played, and skill, as measured by national chess ratings. For the top 15 players, emphasis was placed on relationships among chess skill, spatial abilities, and logical ability. Spatial abilities were measured by the Ravens Progressive Matrices and the Knight's Tour, while logical ability was measured by a Piagetian task. Findings indicated that improvement in skill was related to experience. Spatial abilities appeared to be more important than logical abilities to skill in chess. (RH)

Experience, Spatial Abilities, and Chess Skill

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Running Head: EXPERIENCE, SPATIAL ABILITIES, AND CHESS SKILL

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Abstract

This paper examines chess expertise in children who play competitive chess. We examined (1) the relationship between experience (as measured by number of games played) and skill (as measured by national chess ratings) among 113 school age children (grades 1 through 12); and (2) the relationships among chess skill, spatial abilities (as measured by the Ravens Progressive Matrices and the Knights' Tour) and logical ability (as measured by a Piagetian task) among the top 15 players. Improvement in skill is related to experience, and spatial abilities appear more important than logical abilities in chess skill.

Although much of recent research on decision-making and problem solving has stressed the limits of rationality and how far we humans deviate from "good" decisions, chess is a situation in which humans can learn to make unusually sound decisions. What is particularly striking is that children--not normally known for their rationality--can compete with adults on an even basis in chess tournaments, making good decisions that appear rational or analytic. Further, chess skill among children is not limited to a very few extremely gifted prodigies; many children who are exposed to good chess coaching become competent players.

The study of childhood chess expertise is important for several reasons. First, models of expertise in general and of chess skill in particular must be able to account for high levels of competency among young children. Another reason is that chess playing represents the best thinking of which children are capable. Understanding how they acquire their skill is not only important theoretically, but also may have important practical implications.

While both Christiaen & Verholfstadt (1978) and Chi (1978)used children as subjects in their chess studies, only one of their subjects had an official rating. Virtually no research exists with children who have acquired sufficient expertise to compete with adult tournament players. In contrast, the present research used a sample of 113 nationally rated players and also, in more depth, analyzes performance of a subsample of the very top young players.

While it seems obvious that experience, and logical and spatial abilities, are necessary (but not sufficient) for high performance, little evidence exists to demonstrate the relationships. Holding (1985), for example, concluded that "there is almost no evidence that chessplayers excel in spatial ability" (p. 228).

After an exhaustive review of "virtually all of the available research on chess skill" (p. 226), the relative contribution of practice and abilities topped his list of unsolved problems.

We examined chess club records for one academic year which included national ratings in September, in the following May, grade level, the number of club games played and whether they won, lost or drew. We gave the elite group the following tasks: (1) The Raven's Progressive Matrices (sets A-E), (2) The Knight's Tour (a chess-specific test that is believed to be related to chess aptitude), and (3) a Piagetian task (the plant task designed to measure formal operations; see Kuhn and Brannock, 1977, for details).

We hypothesized that (1) Number of games played and improvement in chess skill (as measured by increase in national rating) wioul be correlated, (2) there would be a linear relationship between the number of games played and national ratings when both are plotted on a logarithmic scale, (3) Children who excel at chess are be above average on spatial abilities (as measured by performance on the Raven's Progressive Matricies), and (4) for children who excel at chess, chess skill will be more highly correlated with spatial abilities (as measured by both the Raven's and a chess-specific test called the Knight's Tour) than with a Piagetian test of logical ability.

All four hypotheses were confirmed by examing correlations among the various measures and by comparing top players' Ravens scores to national norms. On the Raven, the mean for our elementary players (N=8, mean grade = 4.25) was 37.7; the 75th percentile for 10 and half year old children (grade 5) is

39. The older students (mean grade=8.3) averaged 53.3 ; 54 is at the 90th percentile for 20 year olds. The tables below show some of the correlational results. We discuss these and other results in terms of their theoretical and educational implications.

Table 1

.Characteristics of sample. Means and standard deviations

Measures	Group			
	Entire Sample[a]		Elite Subsample[b]	
	M	SD	M	SD
Rating	1004	307	1380	190
Grade	6	3.5	5.9	2.9
Number of games played	40.6	49.3	101.4	66.5
Number of rating points gained	142.0	200.5	283.6	293.3

[a] N=113.

[b] n=15.

Table 2

Partial Correlations between games and rating with grade and September rating partialled

	Games Played	May Rating
Wins	.918**	.491**
Games Played	--	.452**

**p<.01

Table 3

Correlations between abilities measures and grade for elite subsample[a]

	Spatial	Knight	Piaget
Grade	.727*	.404	.563*
Spatial	--	.619*	.578*
Knight's		--	-.285

[a](n=15)

*p<.05

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