

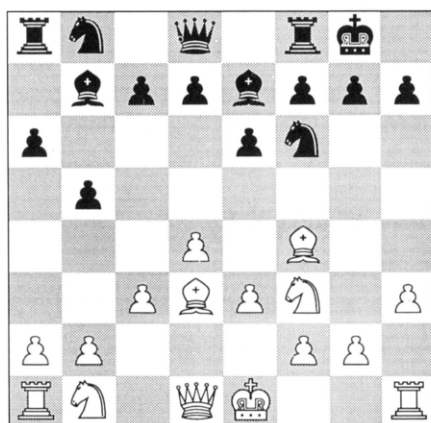
CORRESPONDENCE

MOVE ORDERING BY TIME ORDERING

Dr. Ingo Althöfer

University of Bielefeld
 Faculty of Mathematics
 P.O. Box 8640
 W-4800 Bielefeld 1
 Germany

In the latest issue of the *ICCA Journal* I read with interest Jos Uiterwijk's article on "The Countermove Heuristic" – and an old idea concerning move ordering came back to my mind. Consider a computer program searching a chess tree by "iterative deepening". The idea is to use the search lengths of the depth- n iteration to reorder the *direct* successors of the root before the depth- $(n+1)$ iteration. Let me give an example.



In the position of Diagram 1 Black is to move. There are 31 legal moves. The table shows in what order and in what times Mephisto Lyon 68030 (without hash tables) searches the corresponding subtrees in the 6th iteration of its iterative deepening process.

Diagram 1

no.	1	2	3	4	5	6	7	8	9	10
move	c5	Nd5	d6	d5	Nh5	Re8	h6	Ne4	Qc8	Nc6
time in seconds	65	7	3	2	3	3	2	1	1	2

no.	11	12	13	14	15	16	17	18	19	20
move	Ne8	g6	h5	b4	c6	e5	a5	g5	Ng4	Bxf3
time in seconds	2	2	1	13	1	1	1	3	1	10

Every move with no. ≥ 21 is refuted in at most 2 seconds. "c5" remains the best move after the 6th iteration. Using the time ordering scheme as proposed above, the 7th iteration would be done according to the following order: c5, b4, Bxf3, Nd5, d6, Nh5, Re8, g5, d5, ... This way of ordering costs only very few bookkeeping and sorting operations. It should be successful if the following rule of thumb is sound:

"The longer it takes to refute a move, the higher is its chance to become best move in the next iteration!"

Practice may show whether time ordering (or some variant of it) is really helpful. Of course the criterion 'time used for the subtree' may be substituted for by a count of the nodes searched in that subtree.

A last comment concerns parallel game-tree search where it is a hard problem to synchronize the processors: here also knowledge about the search lengths from shallower searches may help to improve the tree splitting.

Request to Authors of Chess Programs

In my experience there are many interesting and suitable scientific experiments that can be carried out on commercial chess computers or chess programs. (In the sequel I will speak of computers only, but meaning both.) During my own investigations I have learned that the following features support (or would support) such experiments:

- A) Adjustable levels of play:
- (i) fixed depth of search;
 - (ii) fixed thinking time per move;
 - (iii) autoplay mode, where the levels of play can be adjusted separately for the two sides (for instance depth n for White, depth $n-2$ for Black).
- B) "Next-best" function: after having computed the "best" move for a position, the computer can be forced also to compute the "second best", "third best", and so on, move in that position. (The programs of Richard Lang already have this option.)
- C) The option to switch off the following features:
- (i) retaining principal variations;
 - (ii) hash tables;
 - (ii) opening books.

Whereas several commercial chess computers already allow A(i) and C), the other functions are typically missing in current machines. Probably (and especially for my experiments) it would be a good thing if the authors implemented them in their future programs.

CHESS COMPUTERS AND ENDGAME STUDIES 1

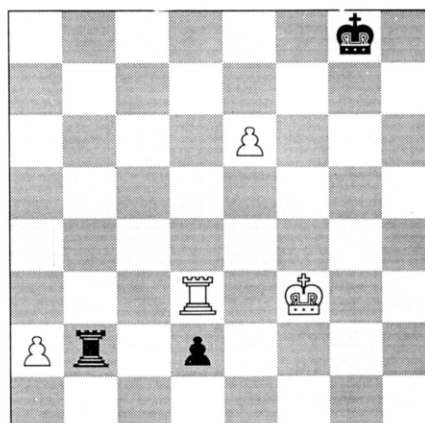
Ken Whyld

Moorland House
Caistor
Lincoln LN7 6SF
England

Brian Gosling's contribution to the March issue of the *ICCA Journal* (Vol. 15, No. 1, pp. 19-23) is essentially the same as his article in the March issue of *Chess*, and I sent the two comments below to that magazine some months ago.

- 1) There was no need to correct the Korolkov study. The composer himself did so, finally producing this position, which won 2nd prize in a tourney in Uzbekistan in 1954.

After 1. Rd8+ Kg7 2. e7 d1=Q+ 3. Rxd1 Kf7 4. Re1 Ke8 5. a4 the same position is reached as after White's third move of the composer's solution to Diagram 3 given on page 20.



- 2) Gosling is right to doubt if the solution to study 3 on page 21 was by Hey. The position first appeared in *Deutsche Schachzeitung*, January 1913, and is based on a consultation game played in Neuburg. Hey drew attention to the fact that it is impossible for White to win in this position – exactly the contrary of the claim attributed to him by Gosling.