

Grandmaster Walter Browne

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versus Chess 4.6

About the Author

J R Douglas has had a professional interest in computers since 1959. For the past ten years, he has been a designer of "larger and larger" computers for Control Data Corp. He and David Cahlander (also with CDC) act as operators of the data communications system on those occasions when Chess 4.6 plays in competition. They also assist in interfacing the Chess program to the operating system and in maintaining the opening book data base.

The organizers of Minnesota's Twin Cities Open invited Northwestern's Chess 4.6 and Control Data's CYBER 176 to take part. Since this World Champion computer system had not been tested in open human competition, its programmers readily accepted the invitation. With a rating of 1936, Chess 4.6 was seeded number one in the 5 round Swiss system tournament, perhaps the first time a computer has been accorded that position.

A new electronic chessboard was used for the first time. The microprocessor which controls the board senses the opponent's moves magnetically, transmits the move in algebraic notation via telephone to CYBER 176, and then indicates CYBER 176's responses by illuminating small lights on the square of the piece to be moved and on the one to which it is to go. Chesstor, as this device is called, also senses the hitting of the chess clock and thus keeps track of the time used.

Chess 4.6 did very well in this event, wrapping up first place in four rounds and finishing the tournament with a perfect 5-0 result. The 30 to 35 points gained brought its rating close to the elusive Expert barrier. This win carried with it an invitation to enter US Champion Walter Browne's simultaneous exhibition.

A large crowd gathered to listen to Grandmaster Browne's lecture and to watch his 44 board simultaneous exhibition. Asked his opinion of computer chess, Browne replied that he did not mind their slow style of play. Browne invited wagers on his computer game and was surprised to find takers in the audience. Later he declined the side bets, saying that although he would win, the time he spent at the computer's board would not be fair to the other players.

Grandmaster Browne's 1978 tour had thus far produced an amazing winning streak, with only two losses and six draws in 17 exhibitions. As this exhibition began, everyone was amazed at Browne's pace around the first six circuits; he barely paused at each board before responding to the posi-

tion before him. He certainly did not seem concerned about the computer's Benoni opening, which requires sharp and exact play. (Later Browne acknowledged that he should have spent more time with this opening.) Browne did, however, appear to be perplexed by the computer's advantage out of the opening, and this put an end to his making blitz mode moves at the computer's table. Here is the way the game went.

Benoni Defense

White: W Browne

Black: Chess 4.6

1 P-Q4 N-KB3 2 P-QB4 P-B4 3 N-KB3
PxP 4 NxP P-K4

Chess 4.6 tends toward sharp opening play.

5 N-N5

Walter Browne tends toward sharp opening play.

5... B-B4

Chess 4.6 has been modified for this event to allow the operator to wait until the visiting Grandmaster arrives before requesting the computer's move. This gives the system maximum time for computation.

6 QN-B3 Castles

Browne's Knight move brings 4.6 out of the opening book. At this point Chess 4.6 has used two minutes and Walter Browne has hardly broken stride as he passed. But now the skid marks in front of the electronic chessboard are added to each time Browne passes by.

7 P-K3 P-Q3 8 B-K2 P-QR3

The chessboard seems to flicker with electronic pride as the machine's estimate of its advantage climbs to more than one half pawn — more than one half a Grandmaster's pawn.

9 N-R3 N-B3

Browne's charming wife spent a lot of time watching the computer and was dismayed as with each successive move the computer's evaluation routine gave a stronger and stronger procomputer assessment of the position.

10 N-B2 B-B4

Chess 4.6 is predicting Browne's moves with impressive accuracy, and it gets about four minutes per move in which to thwart Browne's design for the game.

11 0-0

4.6 expected N-Q5

11 ... Q-Q2

Still retaining a one half pawn lead and expecting 12 B-Q3 P-KR4 13 N-Q5 N-KN5 14 P-K4.

12 P-QN3 K-R1 13 B-N2 R-KN1

4.6 is having trouble finding something to improve the position. It predicts 14 Q-Q2 P-R3 15 QR-Q1 N-K5 16 NxN BxN.

14 N-R4 B-R2

4.6's position seems solid now.

15 B-R3 P-R3 16 R-B1

[Not 16 BxP? BxN... Burt Hochberg]

16 ... QR-Q1 (expecting Q-Q2) 17 N-N4 NxN 18 BxN

All anticipated by 4.6; at this point the 4.6 corner fell prey to a bit of mild panic and requested the next move about three minutes before Browne was due back at the board. The new electronic chessboard seemed not to have sensed the previous move (which indeed it had), and in the flurry of the operations following, Chess 4.6 committed its only error.

18 ... Q-B2

There may be a stronger move.

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GLOSSARY

Algebraic notation: a system of recording chess moves characterized by the assignment of the letters a thru h to the files (columns of squares) and the numbers 1 thru 8 to the ranks (rows of squares) done from the point of view of the player with the White pieces. Usually certain abbreviations are employed. The World Chess Federation (FIDE) strongly endorses the use of algebraic notation (see "descriptive notation").

Annotations of ! or ?: represent someone's opinion of the quality of the move. The exclamation point shows a good move; the question mark shows a poor move.

Benoni opening: the name given to the particular set of opening moves which are played in this game. It is a forceful defense by Black which often leads to great tactical display. It was first studied by Reinganun of Frankfurt in 1825, and was a favorite defense of two World Chess Champions, Alekhine and Tal.

Blitz move: a move made very quickly.

Chess clock: a device used to put a time limit on a chess game. It is a mechanism with two clock movements and faces, one for each player. When a player makes a move, he or she presses one of two buttons on the top of the clock which starts the opponent's clock movement and stops his or her own. In tournaments a player must make a prescribed number of moves in a limited timespan.

Descriptive notation: the traditional system of recording the moves of a chess game, used in this article. A file is named after the piece positioned on it at the start of the game. The ranks are denoted numerically from the point of view of the player having the move.

Expert class: the class of chess player who has a tournament rating of somewhat over 2000 points. As a comparison, the average rating for all members of the United States Chess Federation is around 1300.

Kingside attack: an aggression on the side of the

board on which the Kings were positioned at the start of the game.

Pawn up: to have a material advantage of one pawn or its equivalent, or to have a positional advantage of the same value. Under most circumstances, the advantage of one pawn is sufficient for victory.

Piece up: similar to, but better than, being a pawn up; usually leading to certain victory.

Ratings: a guide to the ability of a chessplayer, based on historical data of performance in over-the-board competition in rated chess tournaments. The system most commonly in use was invented by Dr Arpad Elo. A player gains rating points by winning a tournament game, and loses points by losing a game. The effect of a draw on a rating depends on the difference in rating between the two players in the drawn game. A lower rated player achieving a draw with a higher rated player will gain points, while the higher rated player will in all probability lose points.

Sharp play: playing moves which are likely to lead to great tactical display.

Simultaneous exhibition: an event in which a very strong chess player engages in competition against many weaker opponents in many separate games.

Swiss system tournament: a popular type of chess tournament in the United States. It is usually conducted as follows: in the first round, the players are ordered according to their ratings. Then the top player in the upper half is paired against the top player in the lower half, and so on down to the bottom player in each half. For each game, each player is given one point for a win, one half point for a draw, and zero for a loss. In the second and later rounds players are paired according to the following ordered general principles:

1. A player must not be paired with any other player more than once.
2. Players with equal scores after each round must be paired as much as possible.
3. Colors are assigned by the director of the tournament as equitably as possible.

The program Chess 4.6 was written by David Slate and Larry Atkin of Northwestern University. The Chessor electronic chessboard was constructed by David Cahlander of Control Data Corp.

19 Q-K1

Now 4.6 is only one quarter pawn up, but it thinks 19 Q-Q2 would have been more to the point.

19 . . . B-B4 20 B-KB3 B-Q6

One half pawn up again. Computer fans could relax a bit. Both 4.6 and Browne see the next four moves now. Browne spends a lot of time at our table. Mrs Browne spends a lot of time warning Walter that he should spend a lot of time at our table. She asked how much the machine cost and was told several million dollars. She told Walter that the machine said it had the advantage. Browne was not impressed, although he did start to thump the pieces and our clock as he passed. After a lengthy stay at the board he played.

21 BxB PxP 22 B-K2 B-B4 23 P-B3 P-K5 24 P-B4 B-Q2 25 N-B3 Q-R4

Now the visting master stops, does a double step, smiles: he's got this thing now. The Queen is out of play. Browne begins a Kingside attack, smiles at the spectators, savors his move.

26 Q-R4

Thump, smile. It's lucky that the electronic board can only sense the position of the piece and not the force with which it is moved, for Browne's forceful play intimidates the spectators.

26 . . . B-B3

For the next four moves, 4.6 must find defensive resources that are not obvious to those in attendance, and predictions of an early end to the game begin.

27 R-QB2

4.6 expected P-KN4.

27 . . . P-QN4

Can Browne be distracted?

28 P-KN4

Doesn't look like he is.

28 . . . P-N5 29 N-Q1 R-Q3

Now everyone sees the defense. 4.6 expects 30 P-N5 N-R2 31 N-B2 KR-Q1 32 B-N4 Q-N3 33 B-B5. Browne plays.

30 N-B2 R/1-Q1

If 4.6 survives, the Grandmaster is not

going to like what's happening on the Queen file.

31 R-Q1 RxRch 32 BxR

Small thump, walk away, stop, look back, frown.

32 . . . R-Q3

At this point the clocks show two hours 44 minutes for 4.6 and 22 minutes for Grandmaster Browne.

33 Q-N3 Q-Q1

4.6 correctly projects Browne's game for the next 11 moves.

34 R-B1

Now Browne is defending. Things are not going well at some of the other boards, either, but it is here that Browne spends most of his time.

34 . . . R-Q7

What a nice place for one's Rook.

35 P-N5

4.6 had been expecting this much earlier.

35 . . . PxP 36 PxP N-R2 37 P-N6 PxP

We are a whole pawn up!

38 QxP Q-R5!

Now things start to liven up. Browne looks unnerved and spends a long time on his next move. He gets into trouble at the next board, too. Here he finds:

39 Q-B5 B-Q2

4.6's backers find happiness and will admit that they just may have moved the piece more slowly and punched the clock more vigorously than was necessary, so much so that Browne remarked, with just a hint of a smile, "It is not allowed for the computer

Table 1: The score (record of moves) of the simultaneous exhibition game between Grandmaster Walter Browne and the computer program Chess 4.6, duplicated here in convenient table form. The notation here is algebraic, as opposed to the descriptive notation which is used in the article text. In this type of notation, the colon (:) indicates a capture and the plus sign (+) indicates check. Moves given as square designations alone are pawn moves.

1.	d4	Nf6	33.	Qg3	Qd8
2.	c4	c5	34.	Rc1	Rd2
3.	Nf3	c:d	35.	g5	h:g
4.	N:d4	e5	36.	f:g	Nh7
5.	Nb5	Bc5	37.	g6	f:g
6.	N/1c3	0-0	38.	Q:g6	Qh4
7.	e3	d6	39.	Qf5	Bd7
8.	Be2	a6	40.	Qf4	Q:f4
9.	Na3	Nc6	41.	e:f	e3
10.	Nc2	Bf5	42.	Ne4	e2
11.	0-0	Qd7	43.	B:e2	R:e2
12.	b3	Kh8	44.	N:c5	Bc8
13.	Bb2	Rg8	45.	Rd1	Re8
14.	Na4	Ba7	46.	a3	b:a
15.	Ba3	h6	47.	Ra1	g5
16.	Rc1	R/a d8	48.	f:g	Re5
17.	Nb4	N:b4	49.	b4	a5
18.	B:b4	Qc7	50.	Nd3	R:g5+
19.	Qe1	Bc5	51.	Kf2	a:b
20.	Bf3	Bd3	52.	N:b4	Ra5
21.	B:c5	d:c	53.	Ke3	Be6
22.	Be2	Bf5	54.	Kd4	Ng5
23.	f3	e4	55.	Nc2	a2
24.	f4	Bd7	56.	Nb4	Ra4
25.	Nc3	Qa5	57.	Kc5	Ne4+
26.	Qh4	Bc6	58.	Kb5	Bd7+
27.	Rc2	b5	59.	Nc6	Nc3+
28.	g4	b4	60.	Kc5	B:c6
29.	Nd1	Rd6	61.	K:c6	R:c4+
30.	Nf2	R/g d8	62.	Kd6	Rd4+
31.	Rd1	R:d1+	63.	Ke5	Rd1
32.	B:d1	Rd6	64.	resigns	

to play psychologically." 4.6 correctly projects Browne's next seven moves.

40 Q-B4 QxQ 41 PxQ P-K6

World Champion 4.6 admonishes US Champion Browne to be careful. Grandmaster Browne admonishes 4.6 not to be overconfident.

42 N-K4 P-K7!

Forcing the exchange of a Bishop for two pawns.

43 BxP RxB 44 NxP B-B1 45 R-Q1 R-K1

Browne now finds a move to make the endgame playable. 4.6 did not anticipate this continuation.

United States Chess Federation Suggested Rules of Play Involving Computational Machinery

The following rules are suggested for use in USCF rated tournaments when one or both players is a computer. In matters not covered by these rules, play is governed by the FIDE (Fédération Internationale des Échecs) Laws, by FIDE Interpretations of the Laws, and by the USCF Tournament Rules and Pairing Rules, interpreted by the arbiter. In such games the player shall be considered to be the chess algorithm being executed on a specific computer.

The following regulations shall govern play:

1. For the algorithmic player (computer), a piece shall be deemed "touched" when a move involving that piece is communicated.
2. A move shall be deemed executed when the move has been executed on the playing chessboard. Only after this shall the opponent's clock be started.
3. The computer and/or the operator shall keep the score of the game.
4. If, during a game, different positions should arise on the playing chessboard and on the chessboard or representation thereof maintained by the algorithmic player, such differences shall be corrected with the assistance of the arbiter by consulting both players' game scores. In resolving such differences, the player whose score has the correct move, but who has executed a wrong one, has to accept certain disadvantages.
5. If, when such discrepancies occur, the game scores are also found to differ, the moves shall be retraced up to the point where the scores agree, and the arbiter shall readjust the clocks accordingly.
6. The algorithmic player's operator(s) shall have the following duties:
 - (a) To make the moves of the algorithmic player on the playing chessboard.
 - (b) To communicate the moves of the opponent to the algorithmic player.
 - (c) To operate the chess clock for the algorithmic player.
 - (d) To inform the algorithmic player, at its request, of the time consumed by either or both players.
 - (e) To claim the game in cases where the time limit has been exceeded.
 - (f) To carry out the necessary formalities in cases where the game is adjourned.
 - (g) To communicate proposals of a draw between the algorithmic player and the opponent.
 - (h) To carry out the functions associated with machine communication failure. During restart, program parameters must be reset to the most recent values. Board position and status, along with clock time, may also be entered.
7. The opponent may appoint a deputy to record the game score.
8. Communication to and from the algorithmic player regarding the moves of the game shall be made in a standard (clear and unambiguous) notation.
9. During the course of a game, an algorithmic player may not request additional data or information which requires human intervention. Such a request shall be considered a violation of Article 19.1a of the Laws. [Article 19.1a says that during a game a chess player may not use any knowledge which is not his/her/its own . . . RS]
10. With the approval of the arbiter in advance of the first round, the operator may resign or accept a draw on behalf of the algorithmic player.

Source: *Official Rules of Chess*, second edition, edited by Martin E. Morrison, David McKay Company Inc., New York, 1978, pages 112 and 113. Reprinted by permission.

46 P-QR3 PxP

Greedy, but what else?

47 R-R1 P-N4 48 PxP R-K4

Expecting N-R4.

49 P-N4 P-R4

It's a whole piece up.

50 N-Q3 RxPch 51 K-B2 PxP 52 NxP R-QR4 53 K-K3 B-K3 54 K-Q4 N-N4

Expecting 55 N-B6 R-KB4 56 N-Q8 R-B5.

55 N-B2

Browne offers a draw. The computer's corner is divided: do we play on for science or bag a draw with a Grandmaster for the record book? Browne returns in less than two minutes. Science prevails: 4.6's Bishop and Knight tactics should be interesting.

55 . . . P-R7 56 N-N4 R-R5

The machine records a 5 point lead for Black.

Browne first plays K-B3, hits the clock and moves away: then he skids to a stop, returns, and announces, "That's not my move," stands, leans, sways, taps, pounds on a loose pawn, and finally plays:

57 K-B5

Browne has missed his last chance at the Rook pawn.

57 . . . N-K5ch 58 K-N5 B-Q2ch 59 N-B6 N-B6ch (the final nail) 60 K-B5 BxN 61 KxB RxPch 62 K-Q6 R-Q5ch 63 K-K5 R-Q8

And Browne resigns.

In the course of this simultaneous exhibition, Chess 4.6 correctly projected 35 of Browne's 58 moves, not including those from the opening library. The largest number of positions examined for any one move was 2,158,456 in just over nine minutes. In total, Chess 4.6 used just over four hours of computation time, whereas Grandmaster Browne spent 26 minutes at the board.

Browne was not pleased with his performance in general; six wins and six draws were scored against him, dropping his percentage for the day to 73%. But the game Chess 4.6 played will certainly provide some pleasant moments to those who play over the moves, and they're almost certain to find the computer's style refreshing.

Editor's Comments

After seeing Douglas' article, our readers are advised against being misled about the strength of play of which the program Chess 4.6 is capable. In this particular game, the computer looks very good. It should be remembered, however, that Grandmaster Browne was playing with a number of disadvantages.

This was a simultaneous exhibition, and therefore Browne was playing 44 games at once, including the computer's game.

Browne had to make rapid judgments about moves in 44 games, whereas Chess 4.6 concerned itself with only one game. A side effect of this difference in workload was that the computer could use at least twice as much time as is normally available to it for the calculation of its moves.

Browne also had the disadvantage of not knowing his opponent's strengths and weaknesses. If the human had chosen to play a more closed and positional game, the computer would have looked far worse. Many chessmasters who play simultaneous exhibitions adopt the following strategy: choose sharp lines of play so that the weak opponents may be quickly vanquished, thereby giving more time for concentrating on the stronger players. Unfortunately for Browne, this method played directly to the computer's strong area.

Since this event, Walter Browne has greatly increased his interest in computer chess. It is rumored that he may play another simultaneous exhibition in which all of the opponents are computer programs. Other chessmasters may also be attracted by this new field. Even though the original Levy wager period is ended, computer chess will continue to be a field of great interest to researchers on the cutting edge of computer technology.... RS■

United States Chess Federation Procedure for Registering Chess Playing Computer Programs

In order to allow for legitimate scientific testing of chess playing computer programs, but at the same time to protect the accuracy of the rating assigned to the programs and their opponents, the following procedures are used to register chess playing computer programs.

1. No chess playing computer program may be sold a United States Chess Federation (USCF) membership to allow it to participate in a USCF rated tournament.
2. Any new chess playing computer program must apply for special registration at least one month in advance of its first participation in a USCF rated tournament.
3. Normally, the programmer is the person who may register the chess playing computer program.
4. The following information is necessary for registration:
 - A. Name and address of programmer.
 - B. Name and pertinent identification of the computer (or computers, if more than one may be used to run the program) the program will be using.
 - C. A general written description of the program procedure used in playing. A printout of the program is not usually needed.
5. Any significant program or computer changes which take place after the initial registration must be filed at least one month in advance of participation in a rated tournament with the modifications.
6. Requests for registration should be sent to Craig W. Eliason, member of the USCF Ratings Committee, 11 Woodland Dell Rd, Wilbraham MA 01095. The applicant will be notified by the USCF National Office of the disposition of his application, and, if it is approved, he will be asked for the \$15 annual registration fee and be issued a certificate permitting the program/computer to participate in USCF rated tournaments.

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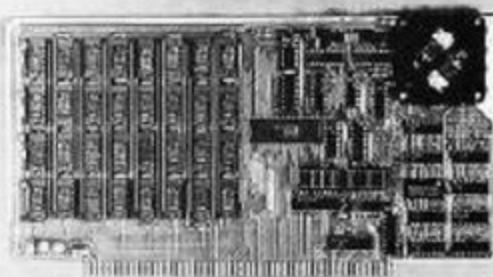
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