WITA

An Autobiography

June 68 - July 70

WITA 0 (black) v R. Langenbach (white)

```
DEBUG?  (NO. ELIMINATES LINE PRINTER OUTPUT)
? Y←
PLAY BOTH?
? N←
NEW GAME?
? Y←
DO YOU WANT WHITE OR BLACK?
? W←

 PBD2706 OUT OFILE:F604000/CHESS=1
WHITE-S MOVE  1     (I HAD  0 LEGAL MOVES)
P-Q4←
    1 P/ K2-   K3
WHITE-S MOVE  2     (I HAD 20 LEGAL MOVES)
P-QB3←
    2 Q    -   KR5
WHITE-S MOVE  3     (I HAD 30 LEGAL MOVES)
N-KB3←
    3 Q    -   K5
WHITE-S MOVE  4     (I HAD 41 LEGAL MOVES)
B-N5←
    4 B/KB1-   Q3
WHITE-S MOVE  5     (I HAD 39 LEGAL MOVES)
COMPUTER TIME =    0.57 MINS. USER TIME =    3.90 MINS.
P-Q5←
    5 N/KN1-   KB3
WHITE-S MOVE  6     (I HAD 45 LEGAL MOVES)
QN-Q2←
    6 Q    XP/ Q4
WHITE-S MOVE  7     (I HAD 49 LEGAL MOVES)
N-N3←
    7 P/KR2-   KR3
WHITE-S MOVE  8     (I HAD 46 LEGAL MOVES)
QXQ←
    8 N/KB3XQ
WHITE-S MOVE  9     (I HAD 35 LEGAL MOVES)
P-K4←
    9 P/KR3XB/KN4
WHITE-S MOVE 10     (I HAD 35 LEGAL MOVES)
COMPUTER TIME =    1.59 MINS. USER TIME =   10.83 MINS.
PXN←
   10 P/KB2-   KB3
WHITE-S MOVE 11     (I HAD 35 LEGAL MOVES)
PXP←
   11 P/ Q2XP/ K3
WHITE-S MOVE 12     (I HAD 33 LEGAL MOVES)
B-B4←
   12 N    -   QB3
WHITE-S MOVE 13     (I HAD 37 LEGAL MOVES)
P-KR3←
   13 B/QB1-   Q2
WHITE-S MOVE 14     (I HAD 39 LEGAL MOVES)
0-0-0←
   14 B/ Q3-   KB5     CHECK
WHITE-S MOVE 15     (I HAD 41 LEGAL MOVES)
COMPUTER TIME =    2.49 MINS. USER TIME =   15.62 MINS.
K-N2←
NOT LISTED--
TRY OR TRACE:
WHITE-S MOVE 15     (I HAD  5 LEGAL MOVES)
COMPUTER TIME =    2.50 MINS. USER TIME =   17.14 MINS.
K-N1←
```

R. LANGENBACH.

JUNE 1968

FIRST VICTORY FOR WITA !.

Note early Q moves!?

```
CØMNET TIME SHARING
ENTER USER CØDE, PLEASE-P972000
AND YØUR PASSWØRD
********
YØU HAVE LINE 02,
01/17/69 10:09 PM.

RUN CHESS

FILES
 NØTDØNE
 RUNNING


DEC. 1968 CHESS PRØGRAM
BY T.A. MARSLAND.


TYPE *8 FØR TRACE ØPTIØNS


PLAY BØTH?
?*'Y
WANT THE CØMPUTER TØ PLAY ITSELF?
?Y
NEW GAME?
?Y
  1 P/ Q2-   Q3              .  1 P/ K2-   K4
  2 P/ K2-   K4              .  2 B/KB1-  QN5    CHECK
  3 P/QB2-  QB3              .  3 B/QN5-  QB4
  4 P/ Q3-   Q4              .  4 B/QB4-   Q3
  5 P/ Q4XP/ K5              .  5 B/ Q3XP/ K4
%RNBQKBNRPP3PPP2P54P38888.8888 4B38PPPP1PPPRNBQK1NR.
SHALL I CØNTINUE.  MAY ALSØ ALTER TRACE ØPTIØNS.
?Y
CØMPUTER TIME =   0.75 MINS. USER TIME =   1.64 MINS. PRØ =  86 SECS
  6 Q    -   Q5              .  6 P/ Q2-   Q3
  7 Q    -  QN5    CHECK     .  7 P/QB2-  QB3
  8 Q    -   Q3              .  8 Q    -  QR4
  9 P/QN2-  QN4              .  9 Q    -  QR3
 10 P/QN4-  QN5              . 10 Q    -  QR5
%RNB1KBNRP4PPP2PQ44P31P6888.888Q74B32PP4PP3PPPRNB1K1NR.
SHALL I CØNTINUE.  MAY ALSØ ALTER TRACE ØPTIØNS.
?Y
CØMPUTER TIME =   2.15 MINS. USER TIME =   3.67 MINS. PRØ = 204 SECS
```

WITA 0

FRIDAY 17 JAN 1969
B-5500 playing itself.
early version of the program.

ALLOWED TO PLAY "RANDOM" MOVES FROM SHORTLIST
THEREFORE LIABLE TO ERROR.

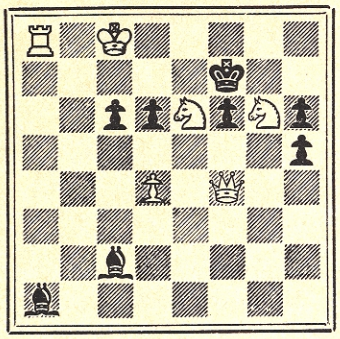
MATE BY WHITE IN
89 MOVES. two Rooks
(after being [redacted] down
at move 75! Queen & pawn.)

USSR v USA match

CHECKMATE

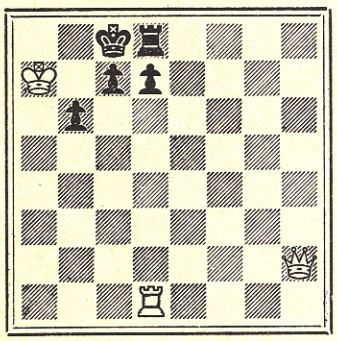
by
GEORGE N. VASSILAKIS
TRW SYSTEMS GROUP

Problem 1



A. A. Alekhine
White to Mate in Three

Problem 2



M. Euwe
White to Mate in Two

$10.00 will be paid to each problem accepted for publication.

Computer vs. Computer

	USSR (White)	USA (Black)
1	P–K4	P–K4
2	N–KB3	N–QB3
3	N–B3	B–B4
4	NxP	NxN
5	P–Q4	B–Q3
6	PxN	BxP
7	P–KB4	BxNch
8	PxB	N–B3
9	P–K5	N–K5
10	Q–Q3	N–B4
11	Q–Q5	N–K3
12	P–B5	N–N4
13	P–KR4	P–KB3
14	PxN	PxNP
15	RxP	R–B1
16	RxP	P–B3
17	Q–Q6	RxP
18	R–N8ch	R–B1
19	QxR mate	

YOUR MOVE

The response to the CHECKMATE announcement in the October issue of this magazine was outstanding.

Here are some excerpts from the mail that has been received:

> "A great idea to prevent the engineering mind from getting stalemated while at home. . . . Through the years, I have enriched my personal chess file with games and problems. I am interested in contributing some items about chess, if you so desire. . . . My fellow workers here at Martin are also awaiting this new feature. . . . How about a contest in which programs written to play a game are pitted against each other. . . . Sock it to us, Botvinnik. . . . Let's get a 'pressure group' going to lobby for government subsidy to promote the Royal Game. . . . Your column would be a fine addition to our activities at lunch time. . . . Suggest items of scientific historical significance, technological connections, etc. . . . As a member of the ROOKS & CROOKS CHESS CLUB here at the Arizona State Prison it was with great interest that I read in your October issue about the possibility of a monthly chess column being published in your fine magazine. . . ."

And so we have decided to start the New Year with the addition of CHECKMATE as a monthly feature. Its success of course will depend on YOU the reader.

To begin with, this author would like to express some thoughts and ideas about this column and ask you to participate by adding new ideas or new versions of old ideas.

- Computerized chess will undoubtedly have high priority since this writer and many readers of this magazine are in the programming business. Any information on what has already been done in this area will be greatly appreciated.
- Quotations from Benjamin Franklin's "The Morals of Chess" will appear from time to time.
- The world champions will be discussed and some of their best games will be published.
- Current news on the activities of Bobby Fisher and other internationally known chess players will be included.
- The "MINIGAME" will make its appearance periodically. This will be a short game played by masters in less than 20 moves.
- The history of chess will be researched thoroughly.

COMPUTERIZED CHESS

On November 20, 1966, a computer at the Institute of Theoretical and Experimental Physics in Moscow made the historic move P–K4 and a computer at Stanford University, California, responded with P–K4. On March 10, 1967, the Russian computer made its 19th move—QxR mate! Several other games were played simultaneously and the USSR computer finally won the tournament.

Does this mean the Russian computers are smarter than the American computers? Of course not. In fact, we can safely say that the IQ of each computer was zero. Why, then, did a slow unsophisticated computer play better chess than its opponent, which was probably the world's fastest and most sophisticated computer at that time? The answer, of course, is the man behind the computer. Each machine was programmed by leading mathematicians and the results merely indicate that the Russian programmers had written a better program.

The motive for the contest was more scientific than sporting. Programming chess is not for the average programmer, and the leading mathematicians can do very little with today's computer technology. Chess falls in the category of problems which have exact solutions but such solutions are beyond the capabilities of present computers. The main problem is the astronomical number of combinations of moves the computer must analyze.

Will computers ever play a good game of chess? Botvinnik believes the time will soon come when a computer will be able to play like a grand master. Professor M. Euwe doesn't think so. He believes computers will be rated as amateurs. A. N. Walker, an astronomer from Manchester University, England, points out that computers are not specifically designed with chess in mind; and a custom-built computer with special circuitry could increase the speed of a chess program 50–60 times.

During the past ten years, computer speeds have increased by a factor of 1,000 or more and present advances in computer technology indicate that a further increase in the order of 1,000 or more might easily be obtained in the next ten years. The trend of micro-miniturization in computer technology indicates that someday we may have computers smaller than a chess clock and a player may be able to enter his company's computer in a chess tournament.

The prices of computers are also going down and we may see the day when a school like MIT or Stanford will be able to dedicate a high speed computer to postal chess. Think of how much analysis such a computer could perform in the 72 hours that a postal chess player is allowed from the time he receives his opponent's move! And further analysis could be performed while waiting for the opponent to answer.

WITA 1 v COKO 1 (Cooper/Kozdrowicki)

CHECKMATE

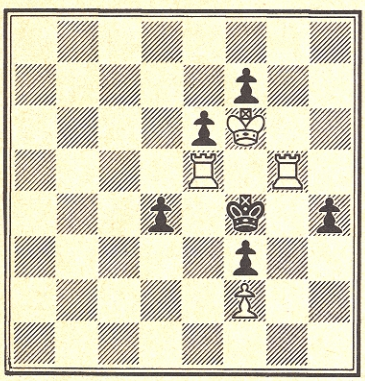
by
GEORGE N. VASSILAKIS
TRW SYSTEMS GROUP

Problem 7

William A. Shinkman

The White Rooks

1910



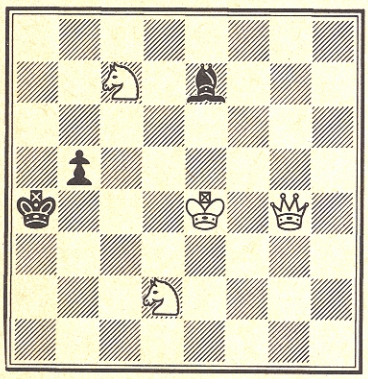
White Mates in Three Moves

Problem 8

Otto Wurzburg

American Chess Bulletin

May–June, 1955



White Mates in Three Moves

Solutions:

Problem 5: 1Q–Q2 threat 2Q–R2; if 1 . . . K–Q3 then 2 Q–R2 mate; if 1 . . . QxQ then 2 N–B3 mate.

Problem 6: 1 R–B6, N–R6; 2 RxNP, PxR; 3 RxN mate; if 2 . . . N–N4; 3 R–N8 mate; if 1 . . . P–R4; 2 KRxPch, PxR; 3 R–R6 mate.

COMPUTERIZED CHESS

If your field is Computer Science and you have difficulty choosing a topic for a thesis why not try "Computerized Chess." It is a very interesting and challenging topic. The following letter from Mr. T. A. Marsland may give you the inspiration you need.

"Although it is nearly two months since I read your item about chess-playing computer programs in the Checkmate column of Software Age, it is only now that I have stirred myself to bring my own program to your attention. This basic program was begun in March 1968, as an extra activity during my post-doctoral year at the University of Washington, and has continued on a part-time basis since that time. The program is written in Burroughs Extended ALGOL for execution on a B-5500. Currently the system is implemented on a commercial timesharing computer operated by COMNET Inc. in Orange, New Jersey.

"The program is accessed through a standard teletypewriter (Model 33 or 35). A set of dynamic control options can be used to direct such information as board position, legal move list and debugging data to the terminal. At any position a static analysis is performed to select up to seven moves for more detailed examination; that list may be further pruned before submitting the remaining plausible moves to the look-ahead procedure.

"The enclosed game was played against another machine, at the University of California, Davis, in a telephone match, it was my program's first victory. The opposition had a simpler scoring function but were using 3 ply (1 full move) look-ahead. At that time the B-5500 program did not have the look-ahead feature implemented, but the static analysis was fairly detailed. When playing against itself, my basic scoring function plays at an average rate of 8 secs. (CPU) per move.

"I realize that this system is not of the caliber of the MIT program, however, I expect great improvements during the year. Meanwhile, I am interested in arranging matches against other programs and hope that you will be able to put me in contact with the authors of those programs that you have heard about."—**T. A. Marsland**

COMPUTER VS. COMPUTER

Marsland's computer was a Burroughs B-5500 at Bell Telephone Laboratories in Holmdel, New Jersey. His opponent at the University of California used an IBM 7044.
As you see, white played an interesting opening and a very impressive end game. Both computers made blunders in the middle game. White missed a king–queen fork on the sixth move but found it on the 7th, and after winning his opponent's queen on the 8th used his own queen to clean up the board. After loosing his queen, black behaved like a 10-year-old who knows he is loosing and starts giving away pieces to end the game quicker.

The important thing, of course, is that computers are learning how to play chess and before long we may have chess masters with names such as IBM 360 mod 101, CDC 8600, SDS Sigma 10, RCA Spectra 90, etc.

	B-5500 (White)	IBM 7044 (Black)		B-5500 (White)	IBM 7044 (Black)
1	P–K4	P–Q4	17	P–K5	NxR
2	B–N5	B–Q2	18	PxPch	K–K1
3	N–QB3	P–Q5	19	RxN	PxP
4	BxB	QxB	20	PxP	N–Q4
5	N–Q5	Q–K3?	21	Q–B6ch	K–B2
6	Q–B3?	P–QB3	22	QxBP	NxB
7	N–QB7ch	K–Q2	23	NxN	P–QR3
8	NxQ	PxN?	24	P–KN3	P–R3
9	QxB	P–KN4	25	Q–B6	P–QR4
10	N–K2	P–B4	26	QxPch	K–N2
11	P–Q3	P–N5	27	QxNPch	K–B2
12	B–B4	N–KB3	28	Q–K6ch	K–N2
13	QxR	N–B3	29	QxKPch	K–R1
14	QxR	N–N5	30	N–N6ch	K–N1
15	P–QB3	NxQPch	31	Q–K6ch	K–R2
16	K–Q2	NxBP	32	Q–KB7	checkmate

```
?W
WHITE-S MØVE  1     (I HAD    0 LEGAL MØVES)
?P-K4
        1 P/ K2-   K4
WHITE-S MØVE  2     (I HAD   20 LEGAL MØVES)
?P-KB4
        2 P/ K4XP/KB5
WHITE-S MØVE  3     (I HAD   26 LEGAL MØVES)
N-KB4
*RO
*P
NØT LISTED--
TRY ØR TRACE:
BLACK-S MØVE  2     (I HAD   29 LEGAL MØVES)

CØNTINUE:
  5  3  4  7  8  4  3  5
  1  1  1  1  0  0  1  1
  0  0  0  0  0  0  0  0
  0  0  0  0  1  1  0  0
  0  0  0  0 -1  0  0  0
  0  0  0  0  0  0  0  0
 -1 -1 -1 -1  0 -1 -1 -1
 -5 -3 -4 -7 -8 -4 -3 -5

CØNTINUE:
?*RO
WHITE-S MØVE  2     (I HAD   20 LEGAL MØVES)

CØNTINUE:
?P-KB4
        2 P/ K4XP/KB5
WHITE-S MØVE  3     (I HAD   26 LEGAL MØVES)
?N-KB3
        3 N/QN1-   QB3
WHITE-S MØVE  4     (I HAD   25 LEGAL MØVES)
?B-QB4
        4 B/KB1-   QB4
WHITE-S MØVE  5     (I HAD   28 LEGAL MØVES)
?P-K4
NØT LISTED--
TRY ØR TRACE:
?P-Q4
        5 B/QB4-   QN5     CHECK
CØMPUTER TIME =    5.84 MINS. USER TIME =    8.71 MINS. PRØ =   75 SECS
WHITE-S MØVE  6     (I HAD   31 LEGAL MØVES)
?P-QB3
        6 B/QN5-    Q3
WHITE-S MØVE  7     (I HAD   34 LEGAL MØVES)
?O-O
        7 Q     -   KB3
WHITE-S MØVE  8     (I HAD   32 LEGAL MØVES)
?P-K5
        8 Q     -   KN3
WHITE-S MØVE  9     (I HAD   36 LEGAL MØVES)
?PXB
        9 Q    XP/  Q3
WHITE-S MØVE 10     (I HAD   36 LEGAL MØVES)
?BXP-KB7
NØT LISTED--
TRY ØR TRACE:
?BXP/KB7
       10 K    XB/KB2
```

I goofed here and had to retract and start my second move again.

R.W. STOBBLEFIELD
v
WITA I
APRIL 1969.

FIRST GAME AGAINST MAC HACK
1 MAY 1969

```
TYPE *8 FOR CONTROL OPTIONS


PLAY BOTH?
?N
NEW GAME?
?Y
DO YOU WANT WHITE OR BLACK?
?W
WHITE-S MOVE  1     (I HAD    Ø LEGAL MOVES)
?P-K4
         1 P/ K2-   K4
WHITE-S MOVE  2     (I HAD   2Ø LEGAL MOVES)
?K-KB3
NOT LISTED--
TRY OR TRACE:
?N-KB3
         2 N/QN1-   QB3
WHITE-S MOVE  3     (I HAD   25 LEGAL MOVES)
?B-QN5
         3 P/QR2-   QR3
WHITE-S MOVE  4     (I HAD   26 LEGAL MOVES)
?B-QR4
         4 B/KB1-   QB4
WHITE-S MOVE  5     (I HAD   28 LEGAL MOVES)
?BXN
         5 P/ Q2XB/QB3
COMPUTER TIME =    1.18 MINS. USER TIME =    2.98 MINS. PRO =  59 SECS
WHITE-S MOVE  6     (I HAD   28 LEGAL MOVES)
?NXP
         6 Q    -   Q5
WHITE-S MOVE  7     (I HAD   41 LEGAL MOVES)
?Q-KR5
         7 P/KN2-   KN3
WHITE-S MOVE  8     (I HAD   41 LEGAL MOVES)
?Q-KN5
         8 Q    XP/ K5     CHECK ? QxBP ch ! much stronger, gains N.
WHITE-S MOVE  9     (I HAD   4Ø LEGAL MOVES)
?K-Q1                                          WITA is very sick.
         9 P/KB2-   KB3
WHITE-S MOVE 1Ø     (I HAD   45 LEGAL MOVES)
?R-K1
        1Ø Q    -   Q4     ? ~~Q-B4~~ Q+R ch !! ~~loses R instead~~
COMPUTER TIME =    2.96 MINS. USER TIME =    6.48 MINS. PRO = 152 SECS
WHITE-S MOVE 11     (I HAD   47 LEGAL MOVES)
?NXP/QB6
        11 B/QB1-   K3
WHITE-S MOVE 12     (I HAD   1Ø LEGAL MOVES)
?QXQ
        12 B/QB4XP/KB7
WHITE-S MOVE 13     (I HAD   26 LEGAL MOVES)
?RXB
        13 K    -   KB2
WHITE-S MOVE 14     (I HAD    3 LEGAL MOVES)
?R-K2
        14 K    -   KN2
WHITE-S MOVE 15     (I HAD    2 LEGAL MOVES)
?RXB
        15 N    -   KR3
COMPUTER TIME =    4.35 MINS. USER TIME =   14.86 MINS. PRO = 192 SECS
WHITE-S MOVE 16     (I HAD   18 LEGAL MOVES)
?Q-Q7
        16 N    -   KB2
WHITE-S MOVE 17     (I HAD    3 LEGAL MOVES)
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NORTHWEST CHESS LETTER
MAY 1969

A CHESS-PLAYING MACHINE. A short article by Tony Marsland

Introduction

For many years attempts have been made to use machines in the playing of chess. One of the earliest was Baron Kempel's machine which, alas, contained a small man. With the advent of the digital computer, however, the use of a truly mechanical move selector has become more feasible. At the major Universities throughout this country chess-playing computer programs are being developed, and in Russia Botvinnik has been working on similar projects for several years. It is the purpose of this note to describe one of the less well known programs, hereafter referred to as WITA*, which was born in Seattle.

As was reported in an earlier issue of the NWCL, WITA was begun in March 1968 at the University of Washington and is implemented on their Burroughs B-5500 computer. The original framework for the program was developed by Bob Stubblefield (of Milwaukie, Ore.) and it included all the input/output procedures for displaying the board and accepting moves in descriptive chess notation. To that fundamental program has been added the game player described below.

WITA The Chess Player

Because WITA is being developed as a hobby it is possible to proceed with its evolution at whatever speed and direction is most convenient. In its infancy much time was spent on the problem of organization and an early decision was made to sacrifice speed of play for organizational simplicity. The current version of WITA is more concerned with generating sound chess moves rather than brilliant ones. Considerable time was spent in developing a program which would select reasonable moves from an analysis of a static board position. By this means it was hoped that WITA would make fairly accurate predicions of its opponents moves and thereby simplify the lookahead problem.

Most of today's chess-playing programs rely on analyzing a fixed selection of plausible moves to a predetermined depth. Each final board position is then "scored" and, by assuming that the opponent will always make his "best" moves, the correct continuation determined. Some programs use two scoring functions to help their play. One to select the moves followed by a more involved function for the final analysis. WITA uses a single complicated scoring function for both jobs. Once a sound chess player has been developed using this approach it should then be possible to consider writing a more abstract learning program which can use these early models as a teacher. Eventually however, the abstract program will have to teach itself through an over the board analysis of its human opponent's play. It is likely that during the next decade computer programs will become regular tournament players (perhaps uniting Pupols and McCormick against a mutual threat), but probably only in the reserve sections.

The Scoring Function

In the current version of WITA, before enumerating the moves from any position, a list is made of all the pieces that are enprise. Potential exchanges are examined in great detail through a study of all the attacking and defending pieces. Should the capture of any of these pieces result in a fork, the subsequent potential loss of material is added to the value of the enprise piece. Relative to a Pawn the pieces have the following values: Knight = 3.0, Bishop = 3.2, Rook = 5.0, Queen = 9.5 and King = 15.0. After listing the enprise pieces, the analysis of the moves is done in three phases. Mobility is the basis of the first stage; at the same time all sacrificial moves (leaving or placing a piece enprise) are penalized, as are those moves which exchange pieces when already behind on material. The form of the first scoring function is as follows:

$$w_1 . (\#\text{ of opponent's replies} / \#\text{ of computer's moves}) +$$
$$w_2 . (\text{value of all pieces still enprise} + \text{value of all pieces already exchanged}) +$$
$$w_3 . (\text{castling score}),$$

where $w_1 = 600$, $w_2 = 20$ and $w_3 = +1$ if the King is moving while castling is still possible, $w_3 = -1$ for a castling move and zero otherwise. The castling score is set at 100. The computer's pieces have positive value while his opponent's are negative. Since the aim is to find moves which minimize the opponent's replies while maximizing WITA's continuations, the moves with lowest score are most desirable.

At the end of the first stage the coarsest pruning takes place and up to eight moves are passed on to the second move analyzer. Here the purpose is to isolate the sacrificial moves. The losses which result from moving a directly or indirectly pinned piece, blocking the defense of a piece or removing the pin on an opponent's piece are computed. In addition scores for increasing the attack on, or defense of, pieces are added. After the first two stages all moves which immediately sacrifice material have been heavily penalized. By this means it is impossible to sacrifice a piece through an oversight. and so only sacrificial moves which are attractive for other reasons need be passed on to the third stage of the scoring function, which performs the true lookahead.

Using WITA with only the first two stages of the scoring function, it plays advanced beginner chess without sacrificing material. It is largely a positional player always trying to maximize its own freedom while minimizing the opponent's replies. Two major deficiencies exist, forking moves which do not involve a capture are not seen and checking moves are too "powerful". In addition, it has been found necessary to inhibit the Queen's moves during the first half dozen moves of the game.

Since lookahead is essential to anticipate simple forks and mating threats, there may be some question about spending so much time analysing static board positions. The reasons are two fold: (a) it allows immediate discontinuation of all poor lines of play and (b), it provides better predictions of the opponents reply and thereby helps to keep the size of the search tree to manageable proportions.

PG	WITA I	MAC HACK
1	P/K2-K4	P/K2-K4
2	N/QN1-QB3	N/KN1-KB3
3	B/KB1-QB4	N/KB3*P/K5
4	N/QB3*N/K4	P/Q2-Q4
5	B/QB4-QN5	P/QB2-QB3
6	Q/Q1-KR5 ch	P/Q4*N/K5
7	Q/KR5*P/K5 ch	Q/Q1-K2
8	Q/K5*Q/K7 ch	B/KB1*Q/K2
9	B/QN5-K2	O-O
10	P/Q2-Q4	R/KB1-Q1
11	B/QB1-K3	B/QB1-K3
12	N/KN1-KR3	B/K3*N/KR6
13	P/KN2*B/KR3	R/Q1-Q4
14	O-O	N/QN1-Q2
15	K/KN1-KN2	B/K2-Q3
16	R/KB1-KR1	R/QR1-K1
17	P/KR3-KR4	N/Q2-KB3
18	P/KR2-KR3	R/Q4-KB4
19	B/K3-KN5	R/K1-K3
20	P/QR2-QR4	P/QR2-QR4
21	P/QN2-QN3	P/QN2-QN3
22	B/K2-QR6	P/KR2-KR3
23	B/KN5-Q2	N/KB3-Q4
24	B/QR6-QB8	R/K3-KN3 ch
25	K/KN2-KB1	R/KB4-KR4
26	B/QB8-KN4	R/KR4*P/KR5
27	K/KB1-KN2	P/KB2-KB4
28	P/KB2-KB3	P/KB4*B/KN5
29	P/KR3*P/KN4	P/K5*P/KB6 ch
30	K/KN2*P/KB3	R/KR5*P/KN5
31	R/KR1-KR5	R/KN5*P/Q5
32	R/QR1-Q1	N/Q4-QB6
33	R/Q1-QR1	R/Q5*B/Q7
34	K/KB3-K3	R/Q7-KR7

SATURDAY
6 SEPT 1969

game #2.

```
BD
-- ** -- ** -- ** -- WR
BR -- ** -- ** WP ** --
-- ** -- WK -- BN WP **
** -- ** -- ** -- ** WP
WR ** -- ** -- ** -- BP
BP BR ** -- BB BP BP --
-- BP -- ** -- ** -- **
** BK ** -- ** -- ** --
```

The above is a listing from MAC HACK. WITA stopped with an invalid index. Look ahead failure.