

# REVIEW

## MORPHY V. CHAMPION

TWO MAJOR developments in the last year have changed the type of chess computer commercially available. The first is the widespread introduction of sensory boards which have eliminated the need to enter moves by pressing buttons. This greatly reduces operator errors, but means that players are no longer obliged to learn algebraic notation — something I had avoided for years but learned within four weeks of buying my first chess computer.

The second development is the incredible speed and strength of the best modern machines. New methods of targeting — using a superior evaluation function and keeping major pieces stored in a separate attack table — enable the machines to make the most efficient use of alpha-beta searching. This increases the speed of move-searching tremendously. Occasionally, however, the program makes an error, and takes as long as any of the older machines to make a move.

### Strictly for experts

In the position shown in figure 1, the Morphy program playing at level 4 — average response time: 2.25 minutes — took more than 23 minutes to find its move. The introduction of faster CPU chips has also accelerated play by a factor of about two. Double speed does not, however, imply double strength.

The strengths of the Morphy/Applied Concepts, March 1981 — and the Champion Sensory Challenger — Fidelity, October 1981 — a great improvement on the earlier machines. As usual, wild claims have been made about their playing strengths. The manufacturers are more modest. Applied Concepts claims ratings of 1800-1900 — BCF 150-160 — while Fidelity's strength of 1771 is given extra credibility by its endorsement by the American Chess Federation. These ratings all apply to the top levels, but these involve excessive response periods.

The top normal playing levels — around two-three minutes per move — would achieve ratings of around BCF 130-140 against opponents not used to playing chess computers. With experience, any competent chess player can defeat a chess computer once he has determined its weaknesses. Ratings for chess computers are subject to considerable error. The machine gains by the fact that, unlike a human, it cannot make a simple blunder; on the other hand, it can never learn by its mistakes.

Targeting can also be carried to its extreme to solve chess problems of the "mate-in-three" type with fantastic speed. Champion Sensory Challenger has taken advantage of this with special mate-solving levels. Morphy does not have this facility and relies instead on its

The Morphy and the Champion Sensory Challenger are a new breed of chess machine — their power and speed would be more than a match for the celebrated Sargon 2.5 from whom they are both descended. John White is the referee.



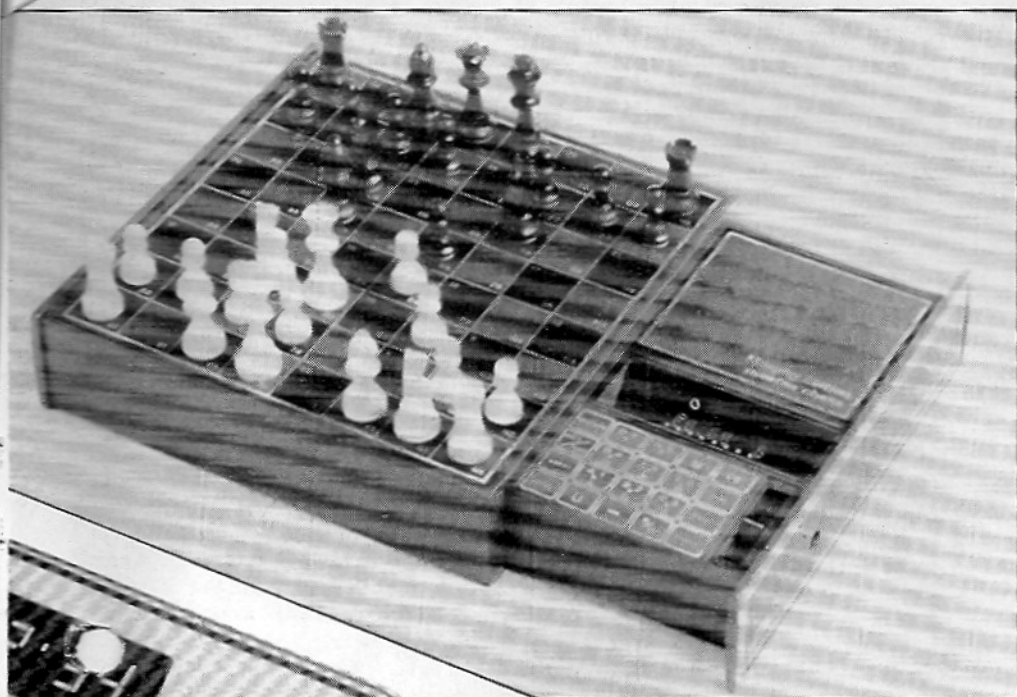
normal search to solve mating problems at a slower speed.

Both these machines have fast, lower-strength levels and can suggest moves to beginners. I could not possibly recommend either of these machines to the beginner — weaker machines are available at a fraction of the price. By the time a beginner could beat either of these monsters, not only would it be obsolete, but electricity probably would be as well.

Both machines can "think" while their opponent decides his move — they assess their response to the move they calculate their opponent will make. The machines can also prompt their opponent by revealing which move they think he should make. Again, both these machines offer random selection between moves of nearly equal merit — an important facility which makes all games different.

Morphy and Champion Sensory Challenger owe much of their design to the Spracklen husband-and-wife team. Both machines are, therefore, descendants of the famous Sargon 2.5 chess program and both are significantly stronger. The Spracklens now work for Fidelity.

It seems to have been the Spracklens who pioneered the new generation of super-fast chess computers with the Sargon 2.5. All programs they have written have been notoriously powerful. Kate Spracklen is a tournament player; Dan worked as a professional



The Champion Sensory Challenger, left, from Fidelity Electronics offers a top-quality end-game. The design of Morphy, above, and the Champion both owe a debt to the Spracklen husband-and-wife team whose pioneering work on the Sargon 2.5 program transformed computer chess.

seconds. That is reckoned to be equivalent to the 2.5's level 4 whose average response was two minutes. Morphy also has a better appreciation of positional play, better castling sense and an improved book-opening library. Space was made for this by deleting the unnecessary messages which the 2.5 used occasionally to flash, such as "You've been practising". Morphy also features an improved end-game which is entered only when the remaining level of material is sufficiently low.

Because Morphy is a module, it will be possible to replace it at a later date with improved modules. Meanwhile, owners of the 2.5 can buy the Morphy cartridge to update their Modular Game System, as the Great Game Machine used to be called. An important addition has been the introduction

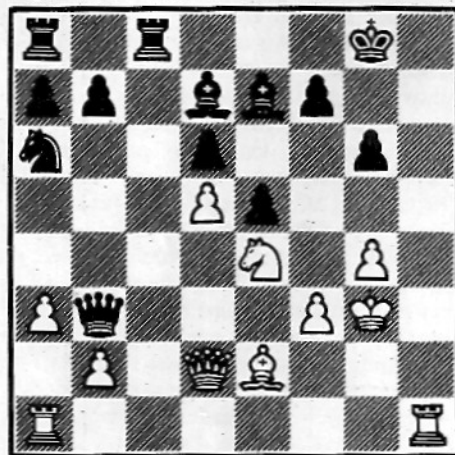


Figure 1.

of two further chess modules which allow continuous play for one game of chess.

Although the book-opening library of Morphy is better than the 2.5's, it is still not very good. The King's Gambit, for example, runs only two moves deep in one of the main lines. The Grunfield-opening cartridge was made available in June 1981, and covers the openings in great depth. When the book cartridge is exhausted, it gives a signal. You then remove it and replace it with Morphy for the mid-game play. It is possible to select your

opening, and to obtain prompts for the next move in the opening.

The end-game seems to start when the material count is less than about 25, counting a queen as 9, a rook as 5, and so on in the usual way. When this point has been reached, Morphy also gives a signal. The player can continue when Morphy switches in extra end-game routines. Alternatively, Morphy can be taken out and the Capablanca cartridge inserted for a powerful finish. Capablanca has been available since October 1981.

Morphy has nine playing levels, of which three — levels 4, 7 and 8 — provide the normal top playing strength. That is, the average response time does not exceed three minutes per move. Other levels provide for postal chess, faster games or beginners.

The programmers claim to have taken special care to take mobility into account with Morphy. This gives the program a surprising degree of strategic insight into positions. I have frequently found that my pieces have somehow become tied up while Morphy retains full mobility, and I have found it very difficult to free my position. This is a considerable and very impressive achievement by the designers. In addition, Morphy will sometimes even make positional sacrifices; for example, exchanging a bishop for one or two pawns on the weak enemy KB2 square.

### Strategic weakness

On the other hand, it is curiously obtuse about sacrifices made against its own pawn formation, and I have often won games by this method. Another surprising strategic weakness is the ease with which the opponent can inflict isolated double pawns on Morphy. These become a terrible handicap in the end-game — if not earlier.

The tactical play of Morphy must not be scorned either. Although not so fast as Champion Sensory Challenger at devising combinations, it can easily see six or seven ply ahead in mid-game. It will, for example, sacrifice a bishop for three pawns in a carefully-worked combination involving an intermediate check, as I have learnt to my cost.

Although the average response times for Morphy to make its move are as stated by the manufacturer, times can vary widely. In games that are either very complicated, or very quiet, the program frequently overruns its stated tournament times, and would lose in a real competition. The program does not automatically adjust its time for thinking according to the time it has remaining.

When the end-game routines are called, Morphy slows noticeably. It is apparent that it can now see up to 10 ply ahead in some lines. Promotion of a pawn now becomes of paramount importance, and Morphy will make any sacrifice to delay arrival of an enemy pawn on the eighth rank, unnecessarily giving up several pieces — the horizon effect — to delay the fateful move.

The end-game has always been the weakest part of any chess computer's game. The play by Morphy is very impressive, and it is, I think, the first commercially-available computer which could win a simple king and rook versus king ending. It plays a bishop,

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knight and king versus king ending well, driving the king into a corner, but fails to realise that the corner must be of the same colour as the bishop for checkmate.

The king is used aggressively and accurately in the end-game — I always felt that the Sargon 2.5 king adopted a kamikaze approach, hurling itself into the fray. Only the pawns' positioning leaves something to be desired.

A considerable amount of theory has been amassed on computer chess end-games, and the Capablanca end-game cartridge reputedly uses look-up tables to find its moves. With 12K of ROM and 3K of RAM, it is claimed to be the only commercial chess program dedicated to playing the end-game. It will also recognise draws, under the three-move or repetition and 50-move rules.

### Variable vocabulary

Sad to say, however, it still cannot win the king, bishop and knight ending against a king, and the difference in the beep tone between it and Morphy is disconcerting. Nevertheless, Capablanca is a useful addition to Morphy, and can look up to 15 ply ahead.

The Great Game Machine and Morphy cost around £295, but can sometimes be found at discount prices. The cartridge alone costs about £95, and Grunfield and Capablanca also cost about £95 so that the complete chess program will cost around £485. Grunfield, which consists essentially of look-up tables, seems to be overpriced when compared with Morphy which is the culmination of years of research.

Other cartridges available for the Great Game Machine include Borcheck draughts at about £70, as well as several others. Borcheck is one of the strongest commercially-available draughts programs. The Morphy program can also be found in the Morphy Encore machine which lacks the capability to change cartridges, but is otherwise the same as the Great Game Machine. It is available at the very reasonable price of £180.

Fidelity's Champion Sensory Challenger or CSC consists essentially of the older Sensory Voice Challenger with a new program. Thus, it offers the sensory board of its predecessor, 64 pre-programmed games against grandmasters, 64 different book openings, a real-time clock and a voice in one of four languages.

I thoroughly dislike the voice, and switched it off during most of the testing. The voice can have its volume or its vocabulary altered, or it can be replaced by a beep tone. The 64 games against grandmasters are certainly interesting, but they must consume a good deal of expensive ROM. I feel that the voice and these games should be offered as optional extras, with a reduction in the price of the main unit.

The sensory board is a delight to use, and is the same as those of the Sensory 8 and Sensory Voice machines. Fidelity also has the most enviable reputation for reliability, and some dealers are offering extended, two-year guarantees. The whole unit is built like a wood and plastic battleship — excellent. A printer, costing around £170, can also be used to provide a permanent record of the game.

Inside the machine, the previous Z-80 chip and program have been superseded by a

Spracklen-designed program on a 6502 chip. Later models will bear the faster 6502A micro-processor. The CSC has performed very well in microcomputer chess tournaments, winning the 1980 World Microcomputer Chess Championship and the 1980 North American Microcomputer Chess Championship outright. The 6502A Elite version won the 1981 World Microcomputer Chess Championship in Hamburg, West Germany.

As you might expect, the standard of play is outstanding and very fast — even by the standards set by the other machines. The style of play bears surprisingly little resemblance to Morphy, despite their common origin, and a few features are noticeably different.

For example, the older Sargon 2.5 was criticised for its propensity to exchange its bishops for opponent knights early in the game. Morphy, however, can hardly be induced to make this exchange, with important implications for play in, say, the Nimzowitsch defence. CSC retains the pattern of exchange of the 2.5. It is debatable which approach is more correct.

Other features of CSC's play include the fact that it is not so prone to suffering from doubled pawns as Morphy. However, it does retain the 2.5's curious habit of making a move, changing its mind, and moving back again in quiescent positions. Equally, in quiescent positions, it will sometimes make a peculiar king move — sometimes back towards the centre immediately after castling.

### Stunning speed

The CSC does not consider mobility factors to nearly the same extent as Morphy, and it is easy to inflict a "bad bishop" or "bad knight" on it. Nevertheless, its power in combinations coupled with the speed with which it performs them makes it easy to see why it has done so well in computer tournaments where ability to play accurately is more important than the ability to form a plan. On the other hand, Philidor has also done well in tournaments precisely because it can form simple plans.

CSC makes automatic moves at once — those situations where only one move is legal — unlike virtually all other chess computers which spend a long time calculating the opponent response. Obviously, when this happens, CSC is unable to prompt the opponent. Simple, strong moves, such as captures, are also made at stunning speed.

CSC can be programmed to complete all its moves within certain time limits. It adjusts the speed of its response according to the time remaining, and can never lose on time. This important facility means that at corresponding time levels it is at a disadvantage with respect

to Morphy, which will always calculate its moves to completion. This is a criticism of Morphy rather than of CSC.

There are eight levels available for normal play, with further levels for problem solving — which is particularly easy to set up on the sensory board — mating problems and postal chess. The eighth level takes an average of six minutes to make its move, while the sixth level takes only three minutes. CSC takes little more than a minute to find the correct move for figure 1 — this does not, of course, imply that it chose it for the same reason, and it gives a different prompt compared with Morphy's.

### Useful for openings

The opening library of CSC is well varied and relatively deep in many of the main lines, leading the machine well into the middle game. Unusually, the book is accessible whether the human plays from the top or bottom of the board or as black or white. Unusually, too, the opponent can ask for a prompt for his next book move while the machine is still playing from the book. This is useful to teach openings.

Fidelity does not give much prominence to the quality of CSC's end-game. This is surely a mistake, since the end-game play is absolutely first class — the best that I have seen in a commercial chess machine. It plays a rook and pawn versus rook ending brilliantly, looking up to 10 ply ahead at the higher levels. It can give mate with a king and rook versus a king, but, like Morphy, drives the enemy king into the wrong corner with a bishop and knight.

The end-game play of grandmasters is well known to be the greatest difference between them and the rest of us, and their play has been studied for many years by psychologists and others in an attempt to find why. These attempts have largely been fruitless — grandmasters themselves admit that they do not know how they assess positions.

The end-game play of all Spracklen-designed programs is very strong, and it seems that they have managed to pin down ingredients which make good end-game play. A book entitled *How to play the end-game in chess* by these two would make fascinating reading.

The Champion Sensory Challenger costs about £330 — and may be found at discount prices — and the board can also be used as a board between two human players when no illegal move will be accepted. It is disappointing to note that the program is not supplied on an interchangeable cartridge — particularly sad since this facility is available on the down-market Mini Sensory Challenger.

### CONCLUSIONS

- Morphy and Champion Sensory Challenger justify their reputations as two of the most powerful chess computers on the market.
- Morphy is supplied on a cartridge which can be extended by contiguous play or by replacement at a later date with a superior version.
- CSC is faster and superior at playing mid-game combinations — at equal

response times — for those who like a real battle, and plays a superior end-game.

- Morphy plays a more human style of chess, which a positional player will appreciate better.
- CSC is less expensive than the full Morphy-Grunfeld-Capablanca combination and has a sensory board and also the voice—if you like it.
- I can strongly recommend both machines.