One Jump Ahead: Challenging Human Supremacy in Checkers, by Jonathan Schaeffer

Reviewed by
Ted Pedersen
Department of Computer Science
University of Minnesota Duluth
Duluth, MN 55812
tpederse@d.umn.edu

January 24, 2000

Chinook was a remarkably successful checkers playing program that defeated many of the world's finest players during its tournament lifetime from 1989 until 1996. In *One Jump Ahead*, Jonathan Schaeffer presents an eyewitness account of Chinook's six year playing career. It is an extraordinary book since Schaeffer's feelings about Chinook are much deeper than those of simply a project leader; he is a loving and ambitious father who pushes his creation to increasingly demanding levels of play. Despite laying claim to the world man-machine checkers championship, the story of Chinook does not have a happy ending. This is a tale worth telling, and Schaeffer does so with honesty and a sense of fun.

Schaeffer's quest to build a world champion checkers program was rooted in his frustration with his chess playing program Phoenix. By the late 1980's he had spent over a decade working on Phoenix. While it was improving steadily, it was apparent that well staffed and generously funded projects had an insurmountable advantage and that Phoenix, while very good, would never be the best. (The success of IBM's Deep Blue just a few years later suggests that Schaeffer's instincts and timing were just about right.)

When asked by a colleague about the status of computer chess, Schaeffer had the same hazy set of reactions as would most AI researchers: Arthur Samuel, IBM mainframes, learning, maybe solved? A little research showed that checkers was not close to being solved and that while Samuel's work was seminal, much of it had to do with overcoming the computing limitations of his day. There was quite a bit of work left to be done with computer checkers but nobody seemed

to be doing it. Schaeffer had found an arena in which he felt he could build a world champion.

Development of Chinook began in 1989. It improved quickly, placing second in the U.S. national championship in 1990. This sudden rise attracted the attention of the reigning world champion, Marion Tinsley. One of the pleasures in reading *One Jump Ahead* is coming to know this fascinating man. Schaeffer portrays him warmly, as a quirky and charming man of deep religious conviction who also happens to be a nearly unbeatable checkers player. In a career of 40 years, he lost at most 10 times. Rarely challenged and often bored by human players, he became a friend and advisor to Schaeffer, hoping that Chinook would one day become a worthy opponent. And in fact, Tinsley got his wish more quickly than he might have expected.

In 1992, Chinook and Tinsley played a 40 game match for the world man-machine checker championship. The dramatic re-creation of this event is the high point of *One Jump Ahead*. Chinook took an early lead in the match. Incredibly, this was the first time that Tinsley had trailed in a match in over 30 years. However, Tinsley ultimately triumphed, winning four games to two, with the rest of the games drawn. Schaeffer quotes Tinsley at the end of the match as exclaiming:

> Three cheers for human beings – and that includes Jonathan!

This is a splendid moment in the book. Tinsley has won narrowly and recognizes that this "man-machine" competition was a human event, and he pays tribute to a challenging adversary. It leaves the reader with a warm feeling of unity and respect for all involved. Tinsley generously agreed to a rematch and the reader expects that Chinook will experience the same rise from defeat as Deep Blue, reclaiming a man-machine title in a second, hotly contested match. Sadly this is not quite how it happened.

The frustration of the near victory against Tinsley seemed to cause an underlying tension in the Chinook team to finally fracture. An original member left the project after questioning the wisdom of rapidly incorporating a more extensive database of opening moves into Chinook. Schaeffer presents this painful event candidly, and to his credit he reprints both sides of the email exchange that led to this parting.

The rematch took place in 1994. However, there was little public interest. Then, after six draws, Tinsley resigned the match and the man-machine championship due to ill health. Don Lafferty, a world championship caliber player and close friend of Tinsley, agreed to finish the 40 game match, which ended in a draw.

This was followed by a distressing fight over the title of man-machine world checkers champion. Schaeffer believed that Tinsley resigned his title to Chinook and that it should now be considered world champion. An official of the governing body of checkers in the USA disagreed. Letters are fired back and

forth, and again Schaeffer lets both sides make their case in their own words by reprinting numerous excerpts.

If the lack of recognition bestowed upon Chinook wasn't enough, Tinsley's health fails and he dies less than a year after the 1994 rematch. There is no human heir apparent and none likely as the number of bright young players is distressingly small. The book ends with Schaeffer admitting that his enthusiasm for checkers has waned and Chinook is retired. A bittersweet ending to a remarkable story.

One Jump Ahead is written for the educated layperson, and includes accessible discussions of computer game playing concepts. It describes the intricacies of creating an evaluation function, and the crucial role of opening books and endgame databases in both computer checkers and chess. It even tackles alpha-beta search and does a nice job of introducing it to non-computer scientists.

There are a number of technical subplots throughout the book that computer scientists will find especially interesting. Perhaps the most engaging surrounds the creation and expansion of Chinook's endgame database. The value of such a resource is that it identifies whether a position with the given number of pieces (or less) is won, lost, or drawn. Chinook began with a four piece database that was soon expanded to five through the volunteer efforts of Ken Thompson, who makes numerous cameo appearances throughout. By the end of its playing days, Chinook had an eight piece endgame database that consisted of over 444 billion positions.

Schaeffer does not use *One Jump Ahead* as a platform to promote AI, in fact he appears reluctant to suggest that Chinook represents AI. He makes an argument early in the book that it represents AI since it creates the illusion of intelligence. It is able to impress people by playing the game of checkers very well and people agree that this is something that can be ascribed to intelligence.

This is not an overwhelming argument, but then Schaeffer does not make strong claims about the contributions of Chinook to AI. He points to some specific contributions to endgame databases and search algorithms, but admits that Chinook, like most other programs that aspire to AI, suffered from the knowledge acquisition bottleneck and that manually augmenting it with human generated knowledge was the key to its success.

This is a dramatic and gripping book that does a great service to the game of checkers. It entices the reader to get out a checker board and play a game or two, or at least follow some of the positions described in the book. Best of all, despite being in retirement, a non–tournament version of Chinook is available for friendly games on the World Wide Web (http://www.cs.ualberta.ca/~chinook). This version uses a six piece endgame database and is a formidable foe.