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Large-scale Analysis with Rybka Aquarium

The average chess game consists of around eighty different positions. A fairly thorough game commentary may contain a couple of hundred additional positions. All of this fits neatly into the traditional game notation format. However, with Rybka Aquarium's large-scale analyzing capabilities, the notation has lost its status as the place to store all your analysis.

Large-scale analysis results in thousands of analyzed positions for a single game or even a single position in a game. All the analyzed positions are stored permanently and are easily accessible along with their evaluations. Large-scale analysis is not practical unless there is an automatic method that is capable of generating most of the analysis. The main purpose of large-scale analysis is increased productivity – something that the next generation of serious chess players will need in order to stay competitive.

The goal of this article is to demonstrate the potential of large-scale analysis compared to more traditional methods and tools. This is done by comparing the results of Aquarium's IDEa (Interactive Deep Analysis) to annotations of a game that has been heavily analyzed by some of the greatest minds of chess, sometimes with computer assistance. A secondary goal was to publish a database of at least 30,000 analyzed positions that would allow the readers to view much more extensive analysis of a game than they have ever seen before. The database can also serve as the starting point for further analysis, e.g. through cooperative effort.

A Practical Application: Fischer-Geller, Skopje 1967

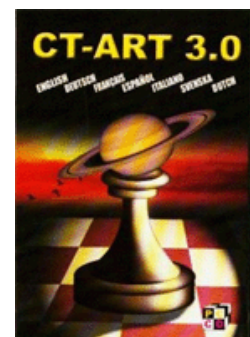
We will apply large-scale analysis to a very famous game, Fischer-Geller, Skopje 1967. Since this game was played more than forty years ago, it has been published in numerous books and magazines and analyzed by many grandmasters, including no fewer than four previous world champions. Fischer himself annotates the game in *My 60 Memorable Games* and Geller in his *Application of Chess Theory*. Edward Mednis and many others have also made important contributions to the understanding of this amazing game.

The most recent comprehensive analysis, that I am aware of, can be found in Garry Kasparov's highly praised *My Great Predecessors, Part II*. Kasparov's book summarizes and augments previous analysis, so I chose it as my main point of reference for comparison with my analysis.

I chose Aquarium's IDEa (Interactive Deep Analysis) as an analysis tool, because it is the primary tool for large-scale analysis. See the [June 2008](#) ChessOK Cafe column for a description of IDEa.

I began at White's twentieth move and worked my way backwards until Black's thirteenth move. Those few moves cover all the most complicated and most deeply analyzed positions. Note that the following is not meant to be a complete analysis of the game. I only indicate some of the interesting possibilities found by IDEa that are not covered in Kasparov's book. I did not consult other publications, except for an occasional look at Fischer's book, as the main purpose of this exercise was to show the

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potential of large-scale analysis. The comparison with Kasparov's extensive analysis is quite sufficient for that purpose.

The variations below are just the tip of the iceberg. You can view every single position that I analyzed by downloading the IDeA analysis tree and viewing it in Aquarium (via the download link at the end of the article). I take advantage of this unusual situation by giving just a few main variations in this article. For the numerous alternatives see the analysis tree.

I chose the Fischer-Geller game for three reasons. First, it is a very complicated and interesting game. Second, it has been thoroughly analyzed over more than four decades, so we can assume that we are comparing IDeA with high quality analysis. Third, I was interested in seeing how IDeA performed in highly tactical positions.

Robert J. Fischer – Yefim Geller

Skopje 1967

1.e4 c5 2.Nf3 d6 3.d4 cxd4 4.Nxd4 Nf6 5.Nc3 Nc6 6.Bc4 e6 7.Be3 Be7 8. Bb3 O-O 9.Qe2 Qa5 10.O-O-O Nxd4 11.Bxd4 Bd7 12.Kb1 Bc6 13.f4



13...Rad8 (+0.76)

The number displayed in parentheses after the move (+0.76) shows IDeA's evaluation of the position. Positive numbers favor White, so White has the advantage here. Already on the first move analyzed by IDeA, we see results that differ markedly from previous analysis of this game. Fischer stated that the following variation gives White the advantage: 13...e5 14.Be3! Bxe4 15.Nxe4 Nxe4 16.Qf3, but Kasparov continues with 16...Nc5!? 17.Bxc5 Qxc5 18.Qxb7 Bf6 19.Bxf7 Kh8 20. Bb3 exf4 21.Qd5 saying that perhaps the advantage is not so great.

Instead of 16.Qf3 (+0.60), IDeA suggests 16.fxe5 Qxe5 (16...dxe5 17. Rd7 Bc5 18.Rxf7 Rxf7 19.Bxf7+ Kxf7 20.Qc4 Ke8 21.Rf1 (+1.56)) 17. Rhe1 Nf6 18.g4 (+1.12).

White can even force the 16...dxe5 variation by exchanging on e5 a move earlier: 15.fxe5 dxe5 (Here 15...Qxe5 loses to 16.Bd4 (+3.25)) 16.Nxe4 Nxe4 17.Rd7 (+1.56) and we have transposed to the variation shown above. The source of Black's problems in these variations is 14...Bxe4.

Even more interesting is 13...e5 14.Nd5 (Instead of 14.Be3) 14...Bxd5 15.Bc3 Qc7 16.Bxd5 Nxd5 17.Rxd5 exf4 18.Rf1 (+0.72).

IDeA's evaluation of the 13...e5 variation is +0.72, close to the evaluation of the game continuation. So in both cases White keeps the advantage in the IDeA analysis.

Mednis recommended 13...b5!? 14.Bxf6 Bxf6 15.Rxd6 Rac8 16.e5 Be7 as giving Black good counter-chances, but Kasparaov continues 17.Rd2!

Rfd8 18.Rhd1 commenting “a pawn is a pawn.” However, IDeA evaluates this position as equal (+0.04), but it seems that 14.e5 is stronger than 14.Bxf6.

13...b5 14.e5 dxe5 15.Qxe5 Bd8 16.Qd6 Bb7 17.f5 exf5 18.a3 Rc8 19.Qf4 b4 20.axb4 Qxb4 21.Qxf5 (+0.68).

It looks like 13...e5 and 13...b5 are no worse than the move played by Geller. There are many alternatives that are worth analyzing. For the details see the analysis tree.



14.Rhf1 (+0.48)

“Also strong is 14.g4 – not to mention 14.f5” (Fischer). Kasparov disagrees: “...14.g4?! is weak in view of 14...d5 15.exd5 (or 15.e5 Nd7 16.f5 Bc5! 17.Qe3 Bxd4 18.Rxd4 Kh8) 15...Nxd5...” and at the end of the variation he comments that Black has achieved equality.

IDeA sides with Fischer and evaluates 14.g4 as no worse than 14.Rhf1 – in fact its evaluation is slightly higher: +0.60 vs. +0.48. The difference from Kasparov’s variation is that IDeA prefers 15.e5, but postpones the f5 thrust and strengthens the d4-square instead:

14.g4 d5 15.e5 Nd7 16.Qe3 (rather than the immediate 16.f5, White prepares Ne2 as an answer to Bc5) 16...Bc5 17.Ne2 Rfe8 18.h4 Bb5 (18...Rc8 19.h5 (+0.60)) 19.h5 (+0.60).

Fischer likes Trifunovich’s post-mortem suggestion 14.f5, but Kasparov isn’t impressed and gives the following variation: 14.f5 exf5 15.exf5 Rd7! 16.Rhf1 Bd8 with a solid defense (Kasparov). IDeA on the other hand continues aggressively resulting in almost a +1 advantage for White:

17.g4 Re8 18.Qf2 h6 19.Qg3 Ne4 20.Nxe4 Rxe4 21.Bc3 Qc5 22.f6 (+0.93).

IDeA sees 14.f5 (+0.76) and 14.g4 (+0.60) as White’s strongest moves, supporting Fischer’s view.



14...b5 (+0.48)

Best according to IDeA. Kasparov says that 14...d5 15.e5 favors White. According to IDeA 14...d5 is a bad move because of 15.exd5 rather than 15.e5:

14...d5 15.exd5 Nxd5 16.f5 Nxc3+ 17.Bxc3 Rxd1+ 18.Qxd1 Qc7 19.f6 (+1.17).

15.f5!! (+0.48)

This move is also preferred by IDeA. Fischer didn't want to lose a tempo playing it safe with 15.a3, and according to IDeA it was a wise choice as 15.a3 only scores +0.18. Kasparov is surprised that neither Fischer nor Geller published anything about the tempting 15.e5, which they analyzed in their post-mortem. Kasparov gives rather detailed analysis of 15.e5, starting with 15.e5!? dxe5 16.fxe5 Nd7 17.Qg4!. He concludes that even against best defense White will end up with a choice between an unclear attack and an endgame with an extra pawn. Here is the beginning of one of the variations given by Kasparov:

17...Qc7 18.Rxf7!! Kxf7 19.Bxe6+ Ke8 20.Qxg7 b4 21.Bg4! etc. and in Kasparov's view the attack more than compensates for the lost material. IDeA doesn't agree and shows that Black can equalize in a spectacular manner with 20...Nxe5 instead of 20...b4:

20...Nxe5 21.Bxe5 (21.Qxh7 Nf7 or 21...a6 (+0.00)) 21...Rxd1 22.Nxd1 Qd8 23.Bg4 Bf3 24.Ne3 Bxg4 25.Qxg4 Qd2 (+0.00).



15...b4 (+1.91)

IDeA sees that Black is lost after this move. The evaluation increases by almost 1.5 pawns and +1.91 in this type of middlegame position is more than Black can handle. There is, however, only one move that scores better than 15...b4 and that is 15...e5, which keeps the evaluation unchanged from the previous move (+0.48). It is the only move that could

possibly save Black. Kasparov dismisses it by saying "...bad is 15...e5? 16.Be3! with the thematic g2-g4-g5," but IDeA comes up with quite a forceful response to 16.Be3:

15...e5 16.Be3 b4 17.Nd5 Nxd5 18.Bxd5 Bb5 19.Bc4 Bxc4 20.Qxc4 Rc8 (+0.48).

If additional analysis refutes 15...e5, then Black is already lost after 14...b5.

16.fxe6! (+1.91)

Starting with this move and up to and including 19.Qf1 both players make the best moves according to IDeA. In most cases the second best move is inferior by a good margin.

16...bxc3 (+1.91)



17.exf7+ (+1.91)

Kasparov wonders why Fischer ignored a "comparatively less complicated way to win" with 17.Rxf6. One possible reason is that he simply saw 17.exf7 as more decisive, like IDeA does. Here are its top five candidate moves:

| Move | flg | Positions | ∇ IDeA |
|-------------------|-----|-----------|--------|
| → 17.exf7+ | | 58078 | +1.91 |
| → 17.Rxf6 | | 2470 | +1.27 |
| 17.Bxc3 | | 47 | +0.07 |
| 17.Rf5 | | 59 | +0.04 |
| 17.Bxf6 | | 51 | -0.41 |

As can be seen in the image, IDeA's evaluation for 17.exf7 is +1.91, but for 17.Rxf6 it is +1.27.

The next few moves are only lightly annotated in Kasparov's book.

17...Kh8 (+1.91) **18.Rf5!** (+1.91) **18...Qb4** (+1.91) **19.Qf1!** (+1.91) **19...Nxe4** (+2.13)



This move is given an exclamation mark by Kasparov and he goes on to show that White wins against other moves. Against 19...Nd7, Kasparov shows the following “drawing” variation:

...after 19...Nd7 20.Rh5 Nf6! 21.Bxf6?! (21.Rf5!) 21...Bxf6 22.Qf5 h6 23.Qg6 Qxe4, White’s attack comes to a standstill (24.Rxh6+ gxh6 25.Qxh6 + Qh7 26.Qxf6+ Qg7 27.Qh4+ Qh7 with a draw).

Amazingly, White is not forced to take the draw and wins by retreating his queen to the queenside: 28.Qb4 (Threatens 29.Rd4, bringing the rook into the attack) 28...d5 29.Qxc3+ Qg7 30.Qxc6 Rxf7 31.Bxd5 Qe5 32.a3 (+2.13) and White has four pawns for the exchange.

White can also win with the immediate 23.Rxh6+, instead of 23.Qg6, but it transposes to the same position:

23.Rxh6+ gxh6 24.Qxf6+ Kh7 25.Qf5+ Kh8 26.Qg6 Qxe4 27.Qh6+ Qh7 28.Qf6+ (+2.13).

If there is any hope for Black in this variation, it could be 21...gxf6, instead of 21...Bxf6, but White has yet another improvement on move twenty-one:

21.Rh6 (instead of Kasparov’s 21.Bxf6?! and 21.Rf5!) 21...Rxf7 22.Bxc3 Qxb3 23.axb3 gxh6 24.Qc4 Be8 25.Rd3 Kg8 26.Ba5 Rb8 27.Rg3+ Kf8 28.Bd2 (+1.56).

Finally, IDeA agrees with Kasparov that 20.Bxc3 (+2.63) is the strongest response to 19...Nd7.

As for 19...Ng4, Kasparov gives the following variation:

19...Ng4 20.Bxc3 Qb7 21.Rh5! Bxe4 22.Bd5 Bxc2+ 23.Kxc2 Ne3+ 24.Kb1! Qxd5 25.Rhxd5 Nxf1 26.Rxf1 and wins.

The evaluation of this variation is +2.13, but IDeA thinks that Black can make things more difficult for White:

22...Ne3 (instead of 22...Bxc2+) 23.Bxb7 Bxc2+ 24.Kc1 Nxf1 25.Kxc2 Ne3+ 26.Kc1 Nxd1 27.Be4 Rxf7 28.Kxd1 Bf6 29.Bxh7 Bxc3 30.Bg6+ Kg8 31.Bxf7+ Kxf7 32.bxc3 (+1.17).

Instead of Kasparov’s 21.Rh5, Fischer had suggested 21.Qf4 – a crushing move according to IDeA:

21.Qf4 Ne5 22.Rh5 Qc8 23.h3 Bb5 24.Rd4 Be2 25.g4 Bf6 26.Ra4 Qd7 27.Qf2 (+2.63).

Kasparov doesn’t mention Fischer’s 21.Qf4 in his book.

20.a3? (+0.00)

This move has been described as a losing mistake. Fischer simply commented “Losing!” while Kasparov says: “White’s instinctive desire to drive away the queen turns into a fatal weakening of the b3-square.” It is a mistake, for sure, but one turning a winning advantage into an equal game according to IDeA. The losing move comes on White’s next move.

After the game Fischer found 20.Qf4!! when in his words “White has a problem-like win” and “Black has no adequate defense.” This position has been deeply analyzed by countless strong grandmasters, although it took many years to establish the main variation due to the complexity of the position. Both Geller and Kasparov agree with Fischer that the position is won; though the winning variations in Kasparov’s book are not convincing as you will see below. Note that Aquarium’s CAP database also points out 20.Qf4!! as well as 20.Rh5, which leads to a draw.

Here is the main variation given in Kasparov’s book: 20.Qf4!! cxb2 21. Rh5! (threatening Bxg7+) 21...Nf6!? (Mednis. Other moves lose quickly) 22.Rh6! (Murey. White threatens Rxf6! Simply 22.Rh4 is interesting too according to IDeA) 22...Rxf7 (this is better than the other move given by Kasparov, 22...d5, which loses after 22.Rxf6) 23.Bxf7 Be4 24.Bb3 d5 25. Bxf6.



Here Kasparov gives 25...gxf6, which loses to 26.Rxf6 (+2.63), but he misses the stronger 25...Bxc2+! 26.Bxc2 Qxf4 (+0.98) and the win is no longer trivial.

Let’s look again at this variation: 20.Qf4!! cxb2 21.Rh5! Nf6!? 22.Rh6! Rxf7 23.Bxf7 Be4. White has another interesting possibility instead of 24. Bb3 as can be seen from the following IDeA screenshot.

| Move | flg | Positions | IDEA |
|----------|-----|-----------|-------|
| → 24.Rh3 | | 33757 | +2.13 |
| → 24.Bb3 | | 23244 | +0.98 |
| 24.Be6 | | 259 | +0.76 |

Besides 24.Bb3 IDeA has found a seemingly much stronger move, 24. Rh3, which maintains the +2.13 evaluation, while the move normally given by annotators, 24.Bb3, results in a much lower evaluation. This move is not mentioned in Kasparov’s or Fischer’s books. Here is a typical variation:

24.Rh3 Rc8 25.Bb3 d5 26.Qe5 Bd6 27.Qe6 Re8 28.Qf7 Be5 29.Bxe5 Rxe5 30.Qxa7 (+2.13).

White is the exchange up and the b2-pawn is just waiting to be picked up. White also has a passed a-pawn and advancing the kingside pawns can even further restrict Black’s activities. An attempt by Black to play more actively with 26...a5 fails too:

24.Rh3 Rc8 25.Bb3 d5 26.Qe5 a5 27.Qe6 Ra8 28.Re3 a4?! 29.Bxf6 axb3 (29...Bxf6 30.Bxd5 Bxd5 31.Qxd5 (+4.50)) 30.Rxb3 Qc5 31.Rc3 Qd6 32.Rc8+ Rxc8 33.Qxc8+ Bf8 34.Be5 (+4.50).

The variation starting with 24.Rh3 is deeply analyzed in the IDeA analysis tree (see download information at the end of the article).

20...Qb7 (+0.00) 21.Qf4? (-2.13)

According to IDeA, this is a losing move in an equal position, as you can see by looking at the evaluations following the moves. Kasparov, perhaps slightly contradicting his comment on move twenty, says: "So in all probability, 21 Qf4? was the decisive mistake in this mind-boggling game." Only 21.Rh5 would have saved the game. Kasparov analyzes 21...Qc8 concluding that White gets the initiative.



Here he gives 22.Bxg7+ and 22.Qe2, but misses 22.Qf4!, which leads to just as promising a position here as it did on move twenty where Fischer missed 20.Qf4!. It's interesting how these two giants of chess miss the strength of this maneuver in the same game, just two moves apart, although to Fischer's credit he found 20.Qf4! two hours after the game was over. Kasparov's oversight is also interesting considering his explanation of why Fischer missed 20.Qf4!.

Black must answer 22.Qf4! with either 22...Nf6 or 22...Bf6 as other moves lose without a fight.

After 22...Bf6, the game could continue: 22...Bf6 23.Re1 d5 24.Rxe4 Rxf7 25.Re3 Kg8 26.Rxc3 Qd7 27.Qd2 Bb7 28.Rc5 (+2.38). White soon wins a second pawn as the d5-pawn can't be defended. 22...Nf6 leads to adventurous play, but doesn't save Black either:

22...Nf6 23.Bxf6 Bxf6 24.Rd3 Bd7 (24...Rde8 25.fxe8=Q Qxe8 26.Qxd6 cxb2 27.Re3 (+2.38)) 25.Qe4 Bf5 26.Rxf5 Rde8 27.fxe8=Q Rxe8 28.Rxc3 Bxc3 29.Qf3 Be5 30.c3 (+2.63).

21...Ba4!! (-2.13) 22.Qg4 (-2.13) Bf6! (-2.13) 23.Rxf6 (-4.50) Bxb3! (-4.50) 0-1

Conclusions

We analyzed moves thirteen to twenty and compared the results to the corresponding analysis in Kasparov's book. IDeA found several new ideas, improvements or outright refutations of some of the previous analysis.

IDeA has been used extensively for opening analysis and it is well-known that it performs well in positions where tactics play a minor role. The results for the Fischer-Geller game show that IDeA is also capable of producing first class analysis in tactical positions.

As I mentioned at the beginning of the article, the main purpose of large-scale analysis is increased productivity. Of course, it would have been impossible to reproduce the thousands of analyzed positions created by IDeA. Analyzing all the game positions thoroughly just to discover the results shown in this article would have taken a considerable amount of manual work. It's doable, but it is more efficient to leave it to IDeA and occasionally give it a nudge using its interactive features.

Downloads

You can examine all the IDeA analysis with Aquarium by downloading the IDeA tree; a PGN file with the analysis from this article can also be downloaded [here](#). This can be used in any chess GUI.

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