

Supplementary Materials

Reevaluation of the 10 example games. No liability assumed for the engine reevaluation results.

Supplementary material S1

Game 1: White: *Stockfish 8* - Black: *AlphaZero*: ECO-C65 Ruy Lopez, Berlin Defense; 0-1

1. e4 e5 2. Nf3 Nc6 3. Bb5 Nf6 4. d3 Bc5 5. Bxc6 dxc6 6. **0-0** (last book move) Nd7 7. Nbd2 **0-0** (Caruana, Fabiano vs. So, Wesley 2015: 0-1 Leko, Peter vs. Giri, Anish: ½-½; 21%-62%-15%W; N=32) 8. Qe1 f6 9. Nc4 Rf7 10. a4 Bf8 11. Kh1 Nc5 12. a5 Ne6 **13. Ncxe5** fxe5 14. Nxe5 Rf6 15. Ng4 Rf7 16. Ne5 Re7 17. a6 c5 18. f4 Qe8 19. axb7 Bxb7 20. Qa5 Nd4 21. Qc3 Re6 22. Be3 Rb6 23. Nc4 Rb4 24. b3 a5 25. Rxa5 Rxa5 26. Nxa5 Ba6 27. Bxd4 Rxd4 28. Nc4 Rd8 29. g3 h6 30. Qa5 Bc8 31. Qxc7 Bh3 32. Rg1 Rd7 33. Qe5 Qxe5 34. Nxe5 Ra7 **35. Nc4** g5 36. Rc1 Bg7 37. Ne5 Ra8 38. Nf3 Bb2 39. Rb1 Bc3 40. Ng1Bd7 41. Ne2 Bd2 42. Rd1 Be3 43. Kg2 Bg4 44. Re1 Bd2 45. Rf1 Ra2 46. h3 Bxe2 47. Rf2 Bxf4 48. Rxe2 Be5 49. Rf2 Kg7 50. g4 Bd4 51. Re2 Kf6 52. e5+ Bxe5 53. Kf3 Ra1 54. Rf2 Re1 55. Kg2+ Bf4 56. c3 Rc1 57. d4 Rxc3 58. dxc5 Rxc5 59. b4 Rc3 60. h4 Ke5 61. hxg5 hxg5 62. Re2+ Kf6 63. Kf2 Be5 64. Ra2 Rc4 65. Ra6+ Ke7 66. Ra5 Ke6 67. Ra6+ Bd6 **0-1**

Original *Stockfish 8* move 13: **Ncxe5** can be the first choice, *Stockfish 7* suggests a6, Nfxe5, Qd1 (N=3)

Stockfish 8 64 Stop + - 4 CPUs
= (0.00) Depth=24/39 13.Qd1 (4/38) 1708 kN/s 19.1%

1. = (0.00): 13.Nfxe5 fxe5 14.Nxe5 Rf6 15.Ng4 Rg6 16.Ne5 Rf6
2. = (0.00): 13.Ncxe5 fxe5 14.Nxe5 Rf6 15.Ng4 Rg6 16.Ne5 Rf6
3. = (-0.15): 13.Qd1 g6 14.Ne3 b5 15.Ng4 c5 16.Nh6+ Bxh6 17.Bxh6 Ba6 18.Qe2 c4 19.dxc4 bxc4 20.b3 Rb8 21

Original *Stockfish 8* move 13: **Ncxe5** can be the first choice, *Stockfish 8* suggests a6 and Nfxe5 (N=2)

Stockfish 7 64 Stop + - 4 CPUs
= (0.00) Depth=22/33 13.Be3 (6/38) 1940 kN/s 48.1%

1. = (0.00): 13.a6 b5 14.Ncxe5 fxe5 15.Nxe5 Rf6 16.Ng4 Rf4 17.Bxf4 Nxf4 18.f3 c5 19.g3 Ng6 20.Qc3 Be6 21.N
2. = (-0.02): 13.Ncxe5 fxe5 14.Nxe5 Re7 15.a6 Re8 16.axb7 Bxb7 17.f4 Bd6 18.Nc4 c5 19.Be3 Rf8 20.e5 Be7
3. = (-0.04): 13.Nfxe5 fxe5 14.Nxe5 Re7 15.a6 g6 16.axb7 Bxb7 17.Qb4 Rb8 18.Rxa7 c5 19.Qc4 Qd4 20.f4 Qx

Original *Stockfish 8* move 35: **Nc4** seems not to be the first choice, *Stockfish 7* suggests Rc1 (N=2)

Stopped Go + - 4 CPUs
= (0.00) Depth=23/51 35.Rb1 (5/20) 2457 kN/s 68.6%

1. = (0.00): 35.Rc1 c4 36.Nxc4 Bc5 37.c3 Bf2 38.Rb1 Ra2 39.Nb2 Bg4 40.Kg2 Be3 41.b4 Bd2 42.h3 Bd7 43.Kf3
2. ♞ (-0.46): 35.Rb1 Ra2
3. ♞ (-0.47): 35.Ng6 Bd6 36.f5 Ra2 37.Rc1 c4 38.bxc4 Ba3 39.Re1 Rxc2 40.Nf4 Bg4 41.Rf1 Bd6 42.d4 Rxc4 43

Original *Stockfish 8* move 35: **Nc4** seems not to be the first choice, *Stockfish 8* suggests Rc1 (N=3)

Stockfish 8 64 Stop + - 4 CPUs
= (0.00) Depth=26/46 35.g4 (4/20) 2181 kN/s 42.5%

1. = (0.00): 35.Rc1 g5 36.Kg1 Bg7 37.Kf2 Bxe5 38.fxe5 Kf7 39.Ke3 Ke6 40.Rb1 Kxe5 41.b4 c4 42.b5 Kd6 43.bf
2. ♞ (-0.84): 35.Ng6 Bd6 36.f5 Ra2 37.Rc1 Bc7 38.Nf4 Bg4 39.Kg1 Ba5 40.h3 Bd2 41.Rb1 Be3+ 42.Kf1 Bxf4 43
3. ♞ (-0.89): 35.Nc4 g5 36.Nd2 Ra2 37.Rc1 Bg7 38.e5 gxh4 39.gxf4 h5 40.Ne4 Bh6 41.Ng5 Bxg5 42.fxg5 Kf7 43

* no liability assumed for the engine re-evaluations due to technical reasons of missing information about the engine parameters in¹

Supplementary material S2

Game 2: White: *Stockfish 8* - Black: *AlphaZero*: ECO-C65 Ruy Lopez, Berlin Defense; 0-1

1. e4 e5 2. Nf3 Nc6 3. Bb5 Nf6 4. d3 Bc5 5. Bxc6 dxc6 6. 0-0 Nd7 7. c3 **0-0** (last book move) 8. d4 **Bd6** (Ginsburg, Gennadi vs. Naumann, Alexander 2005: ½ - ½; 0%-100%-0%, N=2) 9. Bg5 Qe8 10. Re1 f6 11. Bh4 Qf7 12. Nbd2 a5 13. Bg3 Re8 14. Qc2 Nf8 15. c4 c5 16. d5 b6 17. Nh4 g6 18. Nhf3 Bd7 19. Rad1 Re7 20. h3 Qg7 21. Qc3 Rae8 22. a3 h6 23. Bh4 Rf7 24. Bg3 Rfe7 25. Bh4 Rf7 26. Bg3 a4 27. Kh1 Rfe7 28. Bh4 Rf7 29. Bg3 Rfe7 30. Bh4 g5 31. Bg3 Ng6 32. Nf1 Rf7 33. Ne3 Ne7 **34. Qd3?** h5 35. h4 Nc8 36. Re2 g4 37. Nd2 Qh7 38. Kg1 Bf8 39. Nb1 Nd6 40. Nc3 Bh6 41. Rf1 Ra8 42. Kh2 Kf8 43. Kg1 Qg6 44. f4 gxf3 45. Rxf3 Bxe3+ 46. Rfxe3 Ke7 **47. Be1** Qh7 48. Rg3 Rg7 49. Rxc7+ Qxc7 50. Re3 Rg8 51. Rg3 Qh8 52. Nb1 Rxc3 53. Bxc3 Qh6 54. Nd2 Bg4 55. Kh2 Kd7 56. b3 axb3 57. Nxb3 Qg6 58. Nd2 Bd1 59. Nf3 Ba4 60. Nd2 Ke7 61. Bf2 Qg4 62. Qf3 Bd1 63. Qxc4 Bxc4 64. a4 Nb7 65. Nb1 Na5 66. Be3 Nxc4 67. Bc1 Bd7 68. Nc3 c6 69. Kg1 cxd5 70. exd5 Bf5 71. Kf2 Nd6 72. Be3 Ne4+ 73. Nxe4 Bxe4 74. a5 bxa5 75. Bxc5+ Kd7 76. d6 Bf5 77. Ba3 Kc6 78. Ke1 Kd5 79. Kd2 Ke4 80. Bb2 Kf4 81. Bc1 Kg3 82. Ke2 a4 83. Kf1 Kxh4 84. Kf2 Kg4 85. Ba3 Bd7 86. Bc1 Kf5 87. Ke3 Ke6 **0-1**

Stockfish 8 move 34. **Qd3?** seems not to be the first choice, *Stockfish 8* suggests Qc2, Kg, Nd2 (N=5)*

Stockfish 8 64	Stop	+	-	4 CPUs
● = (0.19)	Depth=25	34.Qc2 (4/38)	1664 kN/s	36.4%

1. = (0.19): 34.Nd2 h5 35.Qc2 Ref8 36.Kg1 Rd8 37.h4 Rff8 38.Qd3 Qh7 39.Nf3 Qg7 40.Rb1 Rf7 41.Qc3 g4 42.N
 2. = (0.14): 34.Qc2 h5 35.h4 Rd8 36.Qd3 g4 37.Nd2 c6 38.dxc6 Bxc6 39.Nd5 Nxd5 40.cxd5 Be8 41.Nc4 b5 42.N
 3. = (0.09): 34.Kg1 h5 35.Kh1 Rd8 36.h4 g4 37.Nd2 c6 38.b3 Ra8 39.bxa4 Rxa4 40.Rb1 Bc7 41.Qd3 Nc8 42.K

Stockfish 8 move 34. **Qd3?** seems not to be the first choice, *Stockfish 7* suggests h4, Qc2 (N=2)*

Stockfish 7 64	Stop	+	-	4 CPUs
● ± (0.27)	Depth=20/33	34.Rg1 (8/38)	1957 kN/s	38.6%

1. ± (0.27): 34.Qc2 h5 35.h4 Rd8 36.Kg1 g4 37.Nd2 c6 38.Qxa4 cxd5 39.Qa6 d4 40.Qxb6 Nc6 41.Nf5 Qf8 42.N
 2. ± (0.26): 34.h4 g4 35.Nd2 c6 36.b3 axb3 37.Qxb3 Rb8 38.a4 h5 39.Ra1 Ng6 40.Qd3 Qf8 41.Nf5 Bxf5 42.exf5
 3. = (0.25): 34.Nd2 h5

Stockfish 8 move 47. **Be1** can be the first choice, *Stockfish 8* suggests Bh2, **Be1**, Rf2 (N=2)*

Stockfish 7 64	Stop	+	-	4 CPUs
● ♣ (-0.81)	Depth=20/32	47.Kh2 (15/26)	2126 kN/s	37.9%

1. ♣ (-0.81): 47.Rf2 Qh6 48.Ref3 Rg8 49.Qf1 Bg4 50.Rd3 Kf8 51.Kh2 Rg6 52.Kh1 Rgg7 53.Bh2 Kg8 54.Bg3 Nx
 2. ♣ (-0.82): 47.Rd2 Rg8 48.Be1 Qh6 49.Rf2 Kd8 50.Bd2 Qg6 51.Qf1 Kc8 52.Ref3 Nxe4 53.Nxe4 Qxe4 54.Bg
 3. ♣ (-0.85): 47.Be1 Qh7 48.Rf2 Rg8 49.Qe2 Qh6 50.Bd2 Qg6 51.Qd3 Rfg7 52.Be1 Qh6 53.Ref3 Rg4 54.Qe2 f

Stockfish 8 move 47. **Be1** can be the first choice, *Stockfish 7* suggests **Be1**, Rf2 (N=2)*

Stockfish 7 64	Stop	+	-	4 CPUs
● ♣ (-0.85)	Depth=21	47.Bf2 (9/26)	1817 kN/s	37.0%

1. ♣ (-0.85): 47.Be1 Qh7 48.Rg3 Rg7 49.Rxc7+ Qxc7 50.Nb1 Rg8 51.Nd2 Qg6 52.Kh2 Kd8 53.Bg3 Kc8 54.Rf2
 2. ♣ (-0.88): 47.Bf2 Qh6 48.Nb1 Rg8 49.Nd2 Rfg7 50.Rg3 Rxc3 51.Bxc3 Rg4 52.Bf2 Qg6 53.Qf3 Kd8 54.Re1 C
 3. ♣ (-0.89): 47.Nb1 Rg7 48.Nd2 Rag8 49.Be1 Qh7 50.Rg3 Rxc3 51.Bxc3 Rg4 52.Bf2 Kd8 53.Kh1 Qg7 54.g3 K

Supplementary material S3

Game 3: White: *AlphaZero* - Black: *Stockfish 8*: ECO-E15 Queen's Indian; 1-0

1. Nf3 Nf6 2. c4 b6 3. d4 e6 4. g3 Ba6 5. Qc2 c5 6. d5 exd5 7. cxd5 Bb7 8. Bg2 Nxd5 9. 0-0 Nc6 10. Rd1 Be7 11. Qf5 Nf6 12. e4 g6 13. Qf4 0-0 14. e5 Nh5 15. **Qg4** (last book move; Carlsen, Magnus vs Ivanchuk, Vassuly 2007: 1-0; Wang, Yue vs Rowson, Jonathan 2007: 1-0; 38%-46%-15%, N=13) **Re8?** 16. Nc3 Qb8 17. Nd5 Bf8 18. Bf4 Qc8 19. h3 Ne7 20. Ne3 Bc6 21. Rd6 Ng7 22. Rf6 Qb7 23. Bh6 Nd5 24. Nxd5 Bxd5 25. Rd1 Ne6 26. Bxf8 Rxf8 27. Qh4 Bc6 28. Qh6 Rae8 29. Rd6 Bxf3 30. Bxf3 Qa6 31. h4 Qa5 32. Rd1 c4 33. Rd5 Qe1+ 34. Kg2 c3 35. bxc3 Qxc3 36. h5 Re7 37. Bd1 Qe1 38. Bb3 Rd8 39. Rf3 Qe4 40. Qd2 Qg4 41. Bd1 Qe4 42. h6 Nc7 43. Rd6 Ne6 44. Bb3 Qxe5 45. Rd5 **Qh8?** 46. Qb4 Nc5 47. Rxc5 bxc5 48. Qh4 Rde8 49. Rf6 **Rf8?** 50. Qf4 a5 51. g4 d5 52. Bxd5 Rd7 53. Bc4 a4 54. g5 a3 55. Qf3 Rc7 56. Qxa3 Qxf6 57. gxf6 Rfc8 58. Qd3 Rf8 59. Qd6 Rfc8 60. a4 **1-0**

Stockfish 8 move 45. **Qh8?** can be a first choice (33%), *Stockfish 8* suggests Qa1, Qh8 (N=3; N=3; N=16)*

Stockfish 8 64 | Stop | + | - | 4 CPUs
 = (0.00) | Depth=19/35 | 2107 kN/s | 0.7%
 1. = (0.00): 45...Qa1 46.Re3 Qf6 47.Rf3 Qh8 48.Rd6 Qe5
 2. = (0.00): 45...Qh8 46.Rd6 Qe5
 3. = (0.21): 45...Qc7 46.Rfd3 a6 47.Kh2 b5 48.a4 Qc6 49.axb5 axb5 50.Rd6 Qc7 51.R3d5 b4 52.Qxb4 Rb8 53.

Note: with or without pre-calculation time (1 minute; or 1 minute plus 1 minute)

Stockfish 8 move 49. **Rf8?** can be a potential move, *Stockfish 8* mainly suggests Kf8 (50%), Rf8 (19%)*

Stockfish 8 64 | Stop | + | - | 4 CPUs
 = (0.00) | Depth=36/39 | 49...Re1 (19/20) | 2168 kN/s | 16.3%
 1. = (0.00): 49...Kf8 50.Qf4 Qg8 51.Rxf7+ Rxf7 52.Qd6+ Ree7 53.Qb8+ Re8 54.Qd6+
 2. = (0.00): 49...Rf8 50.Qf4 a5 51.Bxf7+ Rxf7 52.Rxf7 Rxf7 53.Qb8+ Rf8 54.Qb3+ d5 55.Qxd5+ Rf7 5
 3. = (0.00): 49...d5 50.Bxd5
 4. = (0.00): 49...a5 50.Qf4 Rf8 51.Bxf7+ Rxf7 52.Rxf7 Rxf7 53.Qb8+ Rf8 54.Qb3+ d5 55.Qxd5+ Rf7 5

Note: Hashtable clearance and 1 minute calculation time

Stockfish 8 move 49. **Rf8** is not a first choice (0%), *Stockfish 8* suggests Kf8 (ca. 67%) (N=22)*

Stockfish 8 64 | Stop | + | - | 4 CPUs
 = (0.00) | Depth=31/57 | 49...Re2 (13/20) | 2443 kN/s | 40.1%
 1. = (0.00): 49...Kf8 50.Qf4 Qg8 51.Rxf7+ Rxf7 52.Qd6+ Ree7 53.Qb8+ Re8 54.Qd6+
 2. +- (3.01): 49...c4 50.Bxc4 Kf8 51.Qd4 Qg8 52.Rd6 g5 53.Bb5 a6 54.Rxa6 g4 55.Bxd7 Rxd7 56.Qxd
 3. +- (3.29): 49...g5 50.Qxg5+ Kf8 51.Qf5 c4 52.Bxc4 Qg8 53.Qc5 a6 54.a4 Rd8 55.Bxf7 Qxf7 56.Rxf7
 4. +- (4.91): 49...Re6 50.Bxe6 dxe6 51.g4 Kf8 52.g5 Rd8 53.Qf4 Ke8 54.Rxf7 Qd4 55.Qxd4 Rxd4 56.F

* Permanent brain and 1 minutes precalculation of 49. Rf6 (1 minute) and 1 minute for 49. ...Kf8 (figure 1)

Stockfish 8 move 49. **Rf8** is not the first choice if move 50. pre-calculated by *Stockfish 8* but Kf8 (N=4)*, not shown as a screenshot here (same position)


Supplementary material S4

Game 4: White: *AlphaZero* Black: *Stockfish 8*: ECO-C11 Steinitz Variation, French Classical; 1-0

d4 e6 2. Nc3 Nf6 3. e4 d5 4. e5 Nfd7 5. f4 c5 6. Nf3 Nc6 7. Be3 Be7 8. Qd2 **a6** (last book move) 9. **Bd3** (Kosintseva, Tatiana vs. Matveeva, Svetlana 2010: 1-0; Van der Weide, Karel vs. Vavra, Pravel 2005; 60%-20%-20%, N=5) c4 10. Be2 b5 11. a3 Rb8 12. 0-0 0-0 13. f5 **a5** 14. fxe6 fxe6 15. Bd1 b4 16. axb4 axb4 17. Ne2 c3 18. bxc3 Nb6 19. Qe1 Nc4 20. Bc1 bxc3 21. Qxc3 Qb6 22. Kh1 Nb2 23. Nf4 Nxd1 24. Rxd1 Bd7 25. h4 Ra8 26. Bd2 Rfb8 27. h5 Rxa1 28. Rxa1 Qb2 29. Qxb2 Rxb2 30. c3 Rb3 31. Ra8+ Rb8 32. Ra2 Rb3 33. g4 Ra3 34. Rb2 Kf7 35. Kg2 Bc8 36. Rb6 Ra6 37. Rb1 Ke8 38. Kg3 h6 39. Ng6 Ra3 40. Rb6 Bd7 41. g5 hxg5 42. Kg4 Bd8 43. Rb2 Bc8 44. Nxc5 Ra1 45. Nf3 Ra3 46. Be1 Ba5 47. Rf2 Ra1 48. Bd2 Bd8 49. Rh2 Ne7 50. Bg5 Nf5 51. Bxd8 Kxd8 52. Rb2 Rc1 53. Ngh4 Nxh4 54. Nxh4 Bd7 55. Rb8+ Bc8 56. Ng2 Rxc3 57. Nf4 Rc1 58. Ra8 Kd7 59. Kf3 Rc3+ 60. Kf2 Ke7 61. Kg2 Kf7 62. Ng6 Ke8 63. Ra1 Rc7 64. Kh3 Rf7 65. Kg4 Kd8 66. Nf4 Bd7 67. Ra7 Kc8 68. Kg3 Re7 69. Nd3 Kb8 70. Ra6 Bc8 71. Rb6+ Kc7 72. Rd6 Kb8 73. Nc5 g6 74. h6 Rh7 75. Nxe6 Rxh6 76. Nf4 Rh1 77. Nxd5 Rh3+ 78. Kf4 Rh4+ 79. Ke3 Rh3+ 80. Kd2 Bf5 81. Ne7 Rh2+ 82. Ke3 Bh3 83. Nxc6 Rh1 84. Nf4 Bg4 85. Rf6 Kc7 86. Nd3 Bd7 87. d5 Bb5 88. Nf4 Ba4 89. Kd4 Be8 90. Rf8 Rd1+ 91. Kc5 Rc1+ 92. Kb4 Rb1+ 93. Kc3 Bb5 94. Kd4 Ba6 95. Rf7+ **1-0**


Original Stockfish 8 move 13. **a5?** is not the first choice, Stockfish 8 suggests Nb6, Rb7, and exf5 (N=7)*

Stockfish 8 64	Stop	+	-	4 CPUs
● = (0.15)	Depth=23/40	13...b4 (19/34)	1728 kN/s	40.5%
1. = (0.15): 13...Nb6 14.f6 gxf6 15.Bh6 Kh8 16.exf6 Bxf6 17.Bxf8 Qxf8 18.Nd1 Bg7 19.Qf4 Rb7 20.Ne3 f5 21.c4				
2. ± (0.41): 13...Rb7 14.fxe6 fxe6 15.Na2 Qb6 16.h4 a5 17.Ng5 Nd8 18.g3 b4 19.axb4 axb4 20.b3 Rxf1+ 21.Bxf1				
3. ± (0.64): 13...exf5 14.Nxd5 Nb6 15.Nxb6 Qxb6 16.Kh1 Rd8 17.d5 Bc5 18.Bg5 Be7 19.Bf4 Bc5 20.d6 Be6 21.				




Original Stockfish 8 move 13. **a5?** is not the first choice, Stockfish 8 1CPU suggests Nb6 or exf5 (N=3)*

Stockfish 8 64	Stop	+	-	1 CPU
● = (0.12)	Depth=22/43	13...Rb7 (26/34)	534 kN/s	12.6%
1. = (0.12): 13...Nb6 14.f6 gxf6 15.Bh6 Kh8 16.exf6 Bxf6 17.Bxf8 Qxf8 18.Qf4 Qg7 19.Rad1 Nd7 20.Rf2 h6 21.				
2. ± (0.36): 13...a5 14.fxe6				
3. ± (0.39): 13...exf5 14.Nxd5 Nb6 15.Nxb6 Qxb6 16.Kh1 Rd8 17.d5 Bc5 18.Bg5 Be7 19.Bf4 Bc5 20.d6 Bd7 21.				




Original Stockfish 8 move 13. **a5?** seldom the first choice, Stockfish 7 suggests Nb6 (N=7) and a5 (N=2)*

Stockfish 7 64	Stop	+	-	4 CPUs
● = (0.08)	Depth=17/30		2249 kN/s	0.8%
1. = (0.08): 13...Nb6 14.f6 gxf6 15.exf6 Bxf6 16.Bh6 Bg7 17.Bxg7 Kxg7 18.Na2 f6 19.Nb4 Nxb4 20.axb4 Kh8 21.				
2. ± (0.33): 13...a5 14.fxe6 fxe6 15.a4 b4 16.Nb5 Nb6 17.b3 Ba6 18.Qe1 Qd7 19.Qg3 Rf5 20.Nd6 Bxd6 21.exd6				
3. ± (0.45): 13...Rb7 14.fxe6 fxe6 15.Ng5 Rxf1+ 16.Rxf1 Ndx5 17.dxe5 d4 18.Nf7 Qd7 19.Bf3 Bc5 20.Bf2 dxc				



Original Stockfish 8 move 13. **a5?** seem not to be the first choice, Stockfish 7 1CPU suggests Nb6 (N=3)*

Stockfish 7 64	Stop	+	-	1 CPU
● = (0.25)	Depth=17/25		762 kN/s	0.3%
1. = (0.25): 13...Nb6 14.f6 gxf6 15.Bh6 Kh8 16.Bxf8 Qxf8 17.exf6 Bxf6 18.Nd1 Bg7 19.c3 f6 20.Ne3 Bh6 21.Ra				
2. ± (0.30): 13...exf5 14.Nxd5 Nb6 15.Nxb6 Qxb6 16.Kh1 Rd8 17.d5 Bc5 18.Bg5 Be6 19.Bxd8 Rxd8 20.d6 Be3				
3. ± (0.41): 13...Rb7 14.fxe6 fxe6 15.Na2 Qb6 16.h4 Ndb8 17.Nc3 Nd7 18.Kh2 Rf7 19.Rac1 h6 20.g4 b4 21.axb				




Supplementary material S5

Game 5: White: AlphaZero Black: Stockfish 8: ECO-E17 Queen's Indian; 1-0

1. d4 Nf6 2. c4 e6 3. Nf3 b6 4. g3 Bb7 5. Bg2 Be7 6. 0-0 0-0 7. d5 exd5 8. Nh4 c6 9. cxd5 Nxd5 10. Nf5 Nc7 11. **e4** (last book move; Aronian, Levon vs. Ivanchuk, Vassily 2007, ½ - ½) Bf6 12. Nd6 Ba6 13. Re1 Ne8 14. e5 Nxd6 15. exf6 Qxf6 16. Nc3 Nb7 17. Ne4 Qg6 18. h4 h6 19. h5 **Qh7** 20. Qg4 **Kh8** 21. Bg5 f5 22. Qf4 **Nc5** 23. Be7 Nd3 24. Qd6 Nxe1 25. Rxe1 fxe4 26. Bxe4 Rf5 27. Bh4 Bc4 28. g4 Rd5 29. Bxd5 Bxd5 30. Re8+ Bg8 31. Bg3 c5 32. Qd5 d6 33. Qxa8 Nd7 34. Qe4 Nf6 35. Qxh7+ Kxh7 36. Re7 Nxc4 37. Rxa7 Nf6 38. Bxd6 Be6 39. Be5 Nd7 40. Bc3 g6 41. Bd2 gxh5 42. a3 Kg6 43. Bf4 Kf5 44. Bc7 h4 45. Ra8 h5 46. Rh8 Kg6 47. Rd8 Kf7 48. f3 Bf5 49. Bh2 h3 50. Rh8 Kg6 51. Re8 Kf7 52. Re1 Be6 53. Bc7 b5 54. Kh2 Kf6 55. Re3 Ke7 56. Re4 Kf7 57. Bd6 Kf6 58. Kg3 Kf7 59. Kf2 Bf5 60. Re1 Kg6 61. Kg1 c4 62. Kh2 h4 63. Be7 Nb6 64. Bxh4 Na4 65. Re2 Nc5 66. Re5 Nb3 67. Rd5 Be6 68. Rd6 Kf5 69. Be1 Ke5 70. Rb6 Bd7 71. Kg3 Nc1 72. Rh6 Kd5 73. Bc3 Bf5 74. Rh5 Ke6 75. Kf2 Nd3+ 76. Kg1 Nf4 77. Rh6+ Ke7 78. Kh2 Nd5 79. Kg3 Be6 80. Rh5 Ke8 81. Re5 Kf7 82. Bd2 Ne7 83. Bb4 Nd5 84. Bc3 Ke7 85. Bd2 Kf6 86. f4 Ne7 87. Rxb5 Nf5+ 88. Kh2 Ke7 89. Ra5 Nh4 90. Bb4+ Kf7 91. Rh5 Nf3+ 92. Kg3 Kg6 93. Rh8 Nd4 94. Bc3 Nf5+ 95. Kxh3 Bd7 96. Kh2 Kf7 97. Rb8 Ke6 98. Kg1 Bc6 99. Rb6 Kd5 100. Kf2 Bd7 101. Ke1 Ke4 102. Bd2 Kd5 103. Rf6 Nd6 104. Rh6 Nf5 105. Rh8 Ke4 106. Rh7 Bc8 107. Rc7 Ba6 108. Rc6 Bb5 109. Rc5 Bd7 110. Rxc4+ Kd5 111. Rc7 Kd6 112. Rc3 Ke6 113. Rc5 Nd4 114. Be3 Nf5 115. Bf2 Nd6 116. Rc3 Ne4 117. Rd3 **1-0**


19. ...**Qh7** yielded a 1:1 50%-likelihood to be a *Stockfish 8* move (N=2) via *Stockfish 8*, 64-bit, 4 CPUs*

Stockfish 8 64	Stop	+	-	4 CPUs
● = (0.00)	Depth=26/44	19...Qg5 (10/30)	1623 kN/s	35.9%
1. = (0.00): 19...Qe6 20.g4 d5 21.Ng3 Qf6 22.g5 hxg5 23.Qg4 Nc5 24.Bxg5 Qxb2 25.Rab1 Qc3 26.Rbc1 Qb2 2' ^				
2. = (0.12): 19...Qh7 20.Nd6 Nxd6 21.Qxd6 Qd3 22.Bf4 Qxd6 23.Bxd6 Rd8 24.b3 Bb7 25.Rad1 Na6 26.Be7 R				
3. +- (1.64): 19...Qf5 20.g4 Qh7 21.g5 hxg5 22.Nxg5 Qd3 23.Qg4 Nc5 24.h6 Qg6 25.Re7 Ne6 26.h7+ Kh8 27.N				




20. ...**Kh8** yielded 1:1 50%-likelihood to be a *Stockfish 8* move (N=2) via *Stockfish 8*, 64-bit, 4 CPUs*

Stockfish 8 64	Stop	+	-	4 CPUs
● = (0.00)	Depth=26	20...Kh8 (15/25)	1636 kN/s	29.1%
1. = (0.00): 20...f5 21.Qd1 fxe4 22.Bxe4 Qh8 23.Bd5+ cxd5 24.Qxd5+ Kh7 25.Qe4+ Kg8 26.Qd5+				
2. = (0.18): 20...Kh8 21.b4 d5 22.Nc3 Nd6 23.Bf4 Qf5 24.Qxf5 Nxf5 25.Rad1 Bc4 26.b5 d4 27.Ne4 Bd5 28.Bh3				
3. +- (5.50): 20...f6 21.Nxf6+ Rxf6 22.Re8+ Rf8 23.Be4 Qh8 24.Rxf8+ Kxf8 25.Bg6 Bd3 26.Bxd3 Na6 27.Qf5+				




22. ...**Nc5** seems not to be a *Stockfish 8* first choice move (N=4), recalculated via *Stockfish 8* 64-bit 4 CPUs*

Stockfish 8 64	Stop	+	-	4 CPUs
● = (0.00)	Depth=25/47	22...Bd3 (4/25)	1734 kN/s	35.1%
1. = (0.00): 22...hxg5 23.Nxg5 Qxh5 24.Bf3 Qg6 25.Kg2 Kg8 26.Re7 Qd6 27.Qh4 Qh6 28.Qf4 Qd6				
2. ± (0.66): 22...Nc5 23.Qd6 Kg8 24.Be7 Nxe4 25.Bxe4 fxe4 26.Bxf8 Bc4 27.Qe5 Na6 28.Bd6 Bd3 29.Rad1 g5				
3. ± (0.68): 22...d5 23.Be7 dxe4 24.Bxf8 Nd7 25.Bb4 Nf6 26.Rad1 Nd5 27.Rxd5 cxd5 28.Rd1 Nd8 29.Rxd5 Nef				



22. ...**Nc5** seems not to be a *Stockfish 8* first choice move (N=4), recalculated via *Stockfish 8* 64-bit 1 CPUs*

Stockfish 8 64	Stop	+	-	1 CPU
● = (0.00)	Depth=24/42	22...Bc4 (12/25)	570 kN/s	10.3%
1. = (0.00): 22...hxg5 23.Nxg5 Qxh5 24.Bf3 Qg6 25.Kg2 Kg8 26.Re7 Nc5 27.Rh1 Ne6 28.Qh4 Qh6 29.Qxh6 gx				
2. ± (0.27): 22...Nc5 23.Be7 Nd3 24.Qd6 Nxe1 25.Rxe1 fxe4 26.Bxe4 Rf5 27.Qc7 Bc4 28.Qd8+ Qg8 29.Bxf5 C				
3. ± (0.39): 22...d5 23.Be7 dxe4 24.Bxf8 Nd7 25.Ba3 Ndc5 26.Red1 Be2 27.Rd2 Bg4 28.f3 Bxh5 29.fxe4 Nxe4				



Supplementary material S6

Game 6: White: AlphaZero Black: Stockfish 8: ECO-E17 Queen's Indian; 1-0

1. d4 Nf6 2. Nf3 e6 3. c4 b6 4. g3 Be7 5. Bg2 Bb7 6. 0-0 0-0 7. d5 exd5 8. Nh4 c6 9. cxd5 Nxd5 10. Nf5 Nc7 **11. e4** (last book move; 41%-41%-16%; N=174) **Bf6** (Mohr, Georg vs. Horvath, Sandor 1993, 0-1; Tregubov, Pavel V vs. Gorbatov, Alexej 1996; 1-0) 12. Nd6 Ba6 13. Re1 Ne8 14. e5 Nxd6 15. exf6 Qxf6 16. Nc3 Bc4 17. h4 h6 18. b3 Qxc3 19. Bf4 Nb7 20. bxc4 Qf6 21. Be4 Na6 22. Be5 Qe6 23. Bd3 f6 24. Bd4 Qf7 25. Qg4 Rfd8 26. Re3 Nac5 27. Bg6 Qf8 28. Rd1 Rab8 29. Kg2 Ne6 30. Bc3 Nbc5 31. Rde1 Na4 32. Bd2 Kh8 33. f4 Qd6 34. Bc1 **Nd4?** 35. Re7 f5 36. Bxf5 Nxf5 37. Qxf5 Rf8 38. Rxd7 Rxf5 39. Rxd6 Rf7 40. g4 Kg8 41. g5 hxg5 42. hxg5 Nc5 43. Kf3 Nb7 44. Rdd1 Na5 45. Re4 c5 46. Bb2 Nc6 47. g6 Rc7 48. Kg4 Nd4 49. Rd2 Rf8 50. Bxd4 cxd4 51. Rxd4 Rfc8 52. Kg5 Rf8 53. Rd2 Rc6 54. Rd5 Rc7 55. f5 Rb7 56. a3 Rc7 57. a4 a6 58. Red4 Rcc8 59. Re5 Rc7 60. a5 Rc5 61. Rxc5 bxc5 62. Rd6 Ra8 63. Re6 Kf8 64. Rc6 Ke7 65. Kf4 Kd7 66. Rxc5 Rh8 67. Rd5+ Ke7 68. Re5+ Kd7 69. Re6 Rh4+ 70. Kg5 **1-0**

34. ...**Nd4** ~95% likely to be not a first *Stockfish 8* move (N=20) via *Stockfish 8*, 64-bit, 4 CPUs*

Note: A combination of two data sets: in 11:1 cases with 1minute pre-calculation of opponent's position and 8:0 without any pre-calculation time.

33. ...**Qd6** can be a *Stockfish 8* move (N=1, N=2) via *Stockfish 8* 64-bit 4 CPUs (also: Qc5, Nb2)*

28. ...**Rab8** can be a *Stockfish 8* move (N=4, N=2) via *Stockfish 8* 64-bit 4 CPUs (also: Ne6, Rab8)*

Note: Previous move with a 1-minute pre-calculation time of opponent's position followed by 1 minute of calculation.

28. ...**Rab8** can be a *Stockfish 8* move (N=3, N=5) via *Stockfish8* 64-bit 4 CPUs (also: Ne6, Rab8)*

Note: No pre-calculation time pre-calculation time, only 1 minute after program and engine start.

Supplementary material S7

Game 7: White: *AlphaZero* Black: *Stockfish 8*: ECO-E16 Queen's Indian; 1-0

1. d4 Nf6 2. c4 e6 3. Nf3 b6 4. g3 Bb7 5. Bg2 Bb4+ 6. Bd2 Bxd2+ 7. Qxd2 d5 8. 0-0 0-0 9. cxd5 exd5 10. Nc3 Nbd7 11. **b4** (Beliavsky, Alexander G vs. Kasimdzhanov, Rustam, 2004; 33%-66%-0%, N=3) **c6** (last book move; Stohl, Igor vs. Parker, Jonathan F, 2002; ½-½; 100%-0%-0%, N=1) 12. Qb2 a5 13. b5 c5 14. Rac1 Qe7 15. Na4 Rab8 16. Rfd1 c4 17. Ne5 Qe6 18. f4 Rfd8 19. Qd2 Nf8 20. Nc3 Ng6 21. Rf1 Qd6 22. a4 Rbc8 23. e3 Ne7 24. g4 Ne8 25. f5 f6 26. Nf3 Qd7 27. Qf2 Nd6 28. Nd2 Rf8 29. Qg3 Rcd8 30. Rf4 Nf7 31. Rf2 **Rfe8?** 32. h3 Qd6 33. Nf1 **Qa3** 34. Rcc2 h5 35. Qc7 Qd6 36. Qxd6 Rxd6 37. Ng3 h4 38. Nh5 Ng5 39. Rf1 Kh7 40. Nf4 Rdd8 41. Kh2 Rd7 42. Bh1 Rd6 43. Ng2 g6 44. Nxf4 gxf5 45. gxf5 Rh8 46. Nf3 Kg7 47. Nxf5 fxe5 48. Rg2 Kf6 49. Rg3 Re8 50. Bf3 Rdd8 51. Be2 Rf8 52. Bg4 Nc8 53. Bf3 Rfe8 54. h4 Rh8 55. h5 Rhe8 56. Bg2 Ne7 57. h6 Rh8 58. Rh3 Rh7 59. Kg1 Ba8 60. Nd1 g4 61. Rh5 g3 62. Nc3 Ng8 63. Ne2 Rxh6 64. Nxf3 Rxh5 65. Nxf5+ Kf7 66. Kf2 Nf6 67. Nxf6 Kxf6 68. Rh1 c3 69. Rc1 Rh8 70. Rxc3 Kxf5 71. Rc7 Kf6 72. Bf3 Rg8 73. Rh7 Rg6 74. Bd1 Rg8 75. Rh6+ Ke7 76. Rxb6 Kd7 77. Rf6 Ke7 78. Rh6 Rg7 79. Rh8 Bb7 80. Rh5 Kd6 81. Rh3 Rf7+ 82. Ke1 Bc8 83. Rh6+ Kc7 84. Rc6+ Kb8 85. Rd6 Bb7 86. b6 Ba6 87. Rxd5 Rf6 88. Rxa5 Rxb6 89. Kd2 Bb7 90. Rb5 Rf6 91. Bb3 Kc7 92. Re5 Ba6 93. Kc3 Rf1 94. Bc2 Rh1 95. a5 Kd6 96. e4 Bf1 97. Rf5 Bg2 98. Rf4 Rc1 99. Kb2 Rh1 100. a6 **1-0**

31. ...**Rfe8?** is maybe not the first choice for Stockfish 8 (N=4, 1 min.), but **h5!**; **Rfe8** (N=2, 3-5 min.)*

Stockfish 8 64	Stop	+	-	4 CPUs
± (0.27)	Depth=23/40	31...Rfe8 (10/31)	1662 kN/s	30.4%

1. ± (0.27): 31...h5 32.h3 hxg4 33.hxg4 Rfe8 34.Qh4 Nc8 35.Re2 Qe7 36.Rc2 Qc7 37.Nf3 Qd6 38.Kf2 N
2. ± (0.32): 31...Nd6 32.Ne2 g6 33.fxg6 hxg6 34.h4 Bc8 35.Nf4 Ne8 36.Bf3 g5 37.Nxd5 Nxd5 38.Nxc4 Bf1
3. ± (0.36): 31...Rfe8 32.Qh4 Ng5 33.Nf1 Qd6 34.Qg3 h5 35.gxh5 Qa3 36.Rcc2 Bc8 37.Qg4 Nf7 38.Ng3
4. ± (0.47): 31...Ba8 32.Qh4 Rfe8 33.Nf1 Bb7 34.Rcc2 Ng5 35.Rfe2 Qc7 36.Ng3 g6 37.Rf2 Qd6 38.Qh6 f
5. ± (0.56): 31...Nc8 32.Nf1 Ne7 33.Qf4 h5 34.gxh5 Kh7 35.Ne2 Rh8 36.Nfg3 Kg8 37.Qf3 Qd6 38.Rff1 Q

33. ...**Rfe8?** is maybe not the first choice for Stockfish 8 (N=4, 1 min.), but **h5!** (100%, N=4)*

Stockfish 8 64	Stop	+	-	4 CPUs
= (0.16)	Depth=14/30		74 kN/s	0.1%

1. = (0.16): 33...h5 34.Re2 Qxg3 35.Nxg3 h4 36.Nf1 Ng5 37.Nd2 Rd7 38.Nf3 Nxf3+ 39.Bxf3 g6 40.e4 dx
2. ± (0.28): 33...Qd7 34.Qh4 Qc7 35.Ng3 Nc8 36.Re2 Ng5 37.Nh5 Nd6 38.Nf4 Nde4 39.Nxe4 Nxe4 40.N
3. ± (0.31): 33...Qa3 34.Rcc2 Qd6 35.Qxd6 Nxd6 36.Ng3 Kf7 37.Nh5 Rg8 38.Nf4 Ne8 39.Ne6 Rc8 40.R
4. ± (0.39): 33...Nc8 34.Rf4 Rd7 35.Rc2 Kf8 36.Qf2 h5 37.gxh5 Qe7 38.Bf3 Ng5 39.Qg2 Nxf3+ 40.Qxf3 f
5. ± (0.41): 33...Kf8 34.Qxd6 Rxd6 35.Ng3 Ng8 36.Re2 g6 37.Ree1 Rd7 38.Kf2 Ne7 39.Bf3 Ng5 40.fxg6

Supplementary material S8

Game 8: White: *AlphaZero* Black: *Stockfish 8*: ECO-E16 Queen's Indian; 1-0

d4 Nf6 2. c4 e6 3. Nf3 b6 4. g3 Bb7 5. Bg2 Bb4+ 6. Bd2 Be7 7. Nc3 c6 8. e4 d5 9. e5 **Ne4** (last book move; Ruban, Vadim vs. Tiviakov, Sergei 1993, 1-0; Komarov, Dimitri vs. Tiviakov, Sergei 1993 0-1, 66%-0%-33%; N=3) 10. 0-0 Ba6 11. b3 Nxc3 12. Bxc3 dxc4 13. b4 b5 14. Nd2 0-0 15. Ne4 Bb7 16. Qg4 Nd7 17. Nc5 Nxc5 18. dxc5 a5 19. a3 axb4 20. axb4 Rxa1 21. Rxa1 Qd3 22. Rc1 Ra8 23. h4 **Qd8?** 24. Be4 Qc8 25. Kg2 Qc7 26. Qh5 g6 27. Qg4 Bf8 28. h5 Rd8 29. Qh4 Qe7 30. Qf6 Qe8 31. Rh1 Rd7 32. hxg6 fxg6 33. Qh4 Qe7 34. Qg4 Rd8 35. Bb2 **Qf7?** 36. Bc1 **c3?** 37. Be3 Be7 38. Qe2 Bf8 39. Qc2 Bg7 40. Qxc3 Qd7 41. Rc1 Qc7 42. Bg5 Rf8 43. f4 h6 44. Bf6 Bxf6 45. exf6 Qf7 46. Ra1 Qxf6 47. Qxf6 Rxf6 48. Ra7 Rf7 49. Bxg6 Rd7 50. Kf2 Kf8 51. g4 Bc8 52. Ra8 Rc7 53. Ke3 h5 54. gxh5 Kg7 55. Ra2 Re7 56. Be4 e5 57. Bxc6 exf4+ 58. Kxf4 Rf7+ 59. Ke5 Rf5+ 60. Kd6 Rxh5 61. Rg2+ Kf6 62. Kc7 Bf5 63. Kb6 Rh4 64. Ka5 Bg4 65. Bxb5 Ke7 66. Rg3 Bc8 67. Re3+ Kf7 68. Be2 **1-0**

23. ... **Qd8?** is maybe not the first choice of *Stockfish 8*, but Ra2 (100%, N=3), 1 min.*

Stockfish 8 64	Stop	+	-	4 CPUs
♚ (-0.36)	Depth=29/42	23...Kh8 (7/47)	1978 kN/s	33.1%

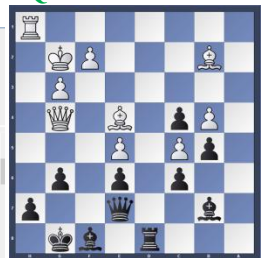
1. ♚ (-0.36): 23...Ra2 24.Be1 Qd8 25.Rd1 Qc7 26.Qd4 Bc8 27.Be4 Ra8 28.Bc3 Ra3 29.Qd2 h5 30.Qb2 Ra8 31.
 2. ♚ (-0.30): 23...Ra3 24.Be4 Qd7 25.Qe2 Qe8 26.Qb2 Ra8 27.Qe2 Kf8 28.Rd1 Ra3 29.Qb2 Ra7 30.Qe2 Kg8
 3. ♚ (-0.30): 23...Qd7 24.Qe2 Ra3 25.Be4 Qe8 26.Qb2 Ra8 27.Qe2 Kf8 28.Rd1 Ra3 29.Qb2 Ra7 30.Qe2 Kg8
 4. ♚ (-0.30): 23...Qd8 24.Qe2 Ra3 25.Be4 Qc7 26.Qb2 Ra7 27.Qe2 Ba8 28.Rd1 Qc8 29.Kg2 Qe8 30.Kg1 Bb7
 5. ♚ (-0.30): 23...Bf8 24.Be4 Qd7 25.Rd1 Qe8 26.Qe2 Be7 27.Rc1 Kf8 28.Rd1 h6 29.Bb1 Qc8 30.Qc2 Ke8 31



35. ... **Qf7?** is maybe not the first choice of *Stockfish 8* but Ra2 (100%, N=3), 1 min., but **Qe8** or **Rd7?***

Stockfish 8 64	Stop	+	-	4 CPUs
= (0.00)	Depth=27/54	35...c3 (5/33)	1912 kN/s	32.6%

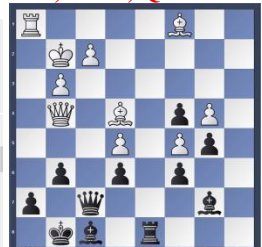
1. = (0.00): 35...Qe8 36.Qh4 Rd7 37.Bc3
 2. = (0.00): 35...Rd7 36.Qf3 Rc7 37.Qf6 Rd7 38.Bc3 Qe8
 3. ± (0.80): 35...Qf7 36.Rxh7 Qxh7 37.Bxg6 Qe7 38.Bf5+ Bg7 39.Bxe6+ Kf8 40.Qf5+ Ke8 41.Qg6+ Kf8 42.Bc
 4. ± (1.05): 35...Bc8 36.Bc1 Qe8 37.Bg5 Rd4 38.Bf6 Qf7 39.Qf4 Rd7 40.Bxc6 Bb7 41.Bxb7 Rxb7 42.Qf3 Rc7
 5. ± (1.36): 35...c3 36.Bxc3 Qf7 37.Ra1 Rd7 38.Bc2 Re7 39.f4 Qe8 40.Bb3 Kh8 41.Qg5 Bc8 42.Bc2 Bd7 43.E



36. ... **c3?** is maybe not the first choice of *Stockfish 8* (100%, N=3), 1 min., but **Rd4?**, **Rd7?**, **Ra8?**, **Qe8?***

Stockfish 8 64	Stop	+	-	4 CPUs
= (0.10)	Depth=25/55		1837 kN/s	36.9%

1. = (0.10): 36...Ra8 37.Bf4
 2. ± (0.28): 36...Rd4 37.Rh4 Be7 38.Bxg6 hxg6 39.Qxd4 Bxh4 40.Qxh4 Bc8 41.Qd8+ Qf8 42.Qd4 Qf7 43.Kf1
 3. ± (0.43): 36...Rd7 37.Rh4 Be7 38.Rxh7 Kxh7 39.Qh5+ Kg7 40.Bh6+ Kh7 41.Bf8+ Kg8 42.Bxg6 Bxf8 43.Bxf
 4. ± (0.75): 36...Rb8 37.Rd1 Rc8 38.Bf4 Qe8 39.Bg5 Qf7 40.Bf6 Bg7 41.Bxg7 Kxg7 42.Rd6 Re8 43.Qd1 Re7
 5. ± (0.82): 36...Rc8 37.Rd1 Rc7 38.Rd8 Rc8 39.Rxc8 Bxc8 40.Bxc6 Qc7 41.Qe4 Bd7 42.Bb7 Qd8 43.Be3 Bf

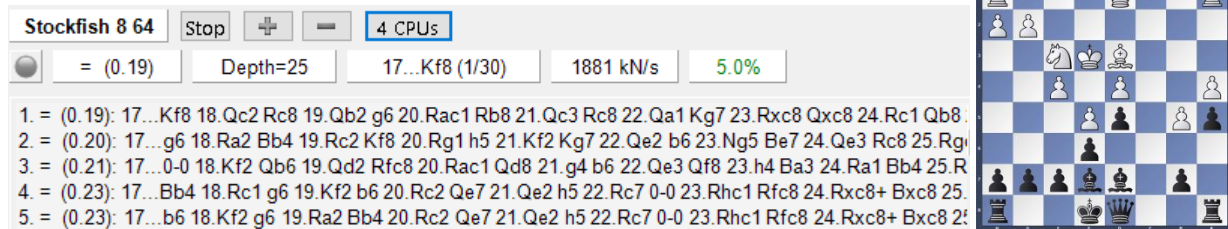


Supplementary material S9

Game 9: White: *AlphaZero*, Black: *Stockfish 8*, ECO-C11 French Classical System, 1-0

1. d4 e6 2. e4 d5 3. Nc3 Nf6 4. e5 Nfd7 5. f4 c5 6. Nf3 **cx**d4 (last book move; Karjakin, Sergey vs. Carlsen, Magnus 2011; ½-½, 35%-42%-21%, N=14;) 7. Nb5 Bb4+ 8. Bd2 Bc5 9. b4 Be7 10. Nbx d4 Nc6 11. c3 a5 12. b5 Nxd4 13. cxd4 Nb6 14. a4 Nc4 15. Bd3 Nxd2 16. Kxd2 Bd7 17. Ke3 **b**6? 18. g4 h5 19. Qg1 hxg4 20. Qxg4 Bf8 21. h4 Qe7 22. Rhc1 g6 23. Rc2 Kd8 24. Rac1 Qe8 25. Rc7 Rc8 26. Rxc8+ Bxc8 27. Rc6 Bb7 28. Rc2 Kd7 29. Ng5 Be7 30. Bxg6 Bxg5 31. Qxg5 fxg6 32. f5 Rg8 33. Qh6 Qf7 34. f6 Kd8 35. Kd2 Kd7 36. Rc1 Kd8 37. Qe3 Qf8 38. Qc3 Qb4 39. Qxb4 axb4 40. Rg1 **b**3? 41. Kc3 Bc8 42. Kxb3 Bd7 43. Kb4 Be8 44. Ra1 Kc7 45. a5 Bd7 46. axb6+ Kxb6 47. Ra6+ Kb7 48. Kc5 Rd8 49. Ra2 Rc8+ 50. Kd6 Be8 51. Ke7 g5 52. hxg5 **1-0**

17. ...**b6?** seems not to be the very first choice of *Stockfish 8* (N=10), but could be at a low likelihood *

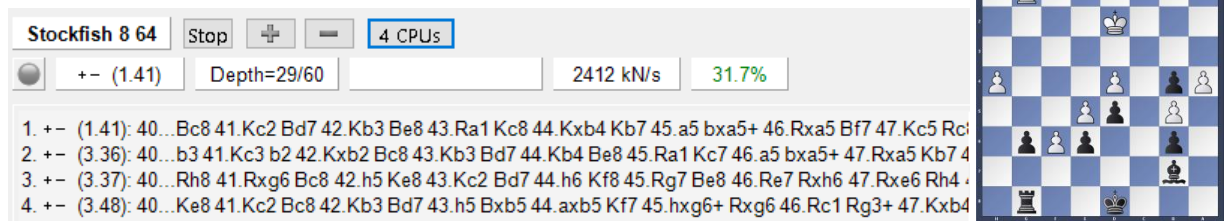


Stockfish 8 64 Stop + - 4 CPUs
= (0.19) Depth=25 17...Kf8 (1/30) 1881 kN/s 5.0%

1. = (0.19): 17...Kf8 18.Qc2 Rc8 19.Qb2 g6 20.Rac1 Rb8 21.Qc3 Rc8 22.Qa1 Kg7 23.Rxc8 Qxc8 24.Rc1 Qb8.
2. = (0.20): 17...g6 18.Ra2 Bb4 19.Rc2 Kf8 20.Rg1 h5 21.Kf2 Kg7 22.Qe2 b6 23.Ng5 Be7 24.Qe3 Rc8 25.Rg1.
3. = (0.21): 17...0-0 18.Kf2 Qb6 19.Qd2 Rfc8 20.Rac1 Qd8 21.g4 b6 22.Qe3 Qf8 23.h4 Ba3 24.Ra1 Bb4 25.R.
4. = (0.23): 17...Bb4 18.Rc1 g6 19.Kf2 b6 20.Rc2 Qe7 21.Qe2 h5 22.Rc7 0-0 23.Rhc1 Rfc8 24.Rxc8+ Bxc8 25.
5. = (0.23): 17...b6 18.Kf2 g6 19.Ra2 Bb4 20.Rc2 Qe7 21.Qe2 h5 22.Rc7 0-0 23.Rhc1 Rfc8 24.Rxc8+ Bxc8 2!

Note: although 100% of cases did not yield b6, still b6 can appear temporarily as the first position for seconds

40. ...**b3?** seems not to be the first choice of *Stockfish 8*, but Bc8 also gives an advantage to white (N=3)*



Stockfish 8 64 Stop + - 4 CPUs
+- (1.41) Depth=29/60 2412 kN/s 31.7%

1. +- (1.41): 40...Bc8 41.Kc2 Bd7 42.Kb3 Be8 43.Ra1 Kc8 44.Kxb4 Kb7 45.a5 bxa5+ 46.Rxa5 Bf7 47.Kc5 Rc1.
2. +- (3.36): 40...b3 41.Kc3 b2 42.Kxb2 Bc8 43.Kb3 Bd7 44.Kb4 Be8 45.Ra1 Kc7 46.a5 bxa5+ 47.Rxa5 Kb7 4.
3. +- (3.37): 40...Rh8 41.Rxg6 Bc8 42.h5 Ke8 43.Kc2 Bd7 44.h6 Kf8 45.Rg7 Be8 46.Re7 Rxh6 47.Rxe6 Rh4 .
4. +- (3.48): 40...Ke8 41.Kc2 Bc8 42.Kb3 Bd7 43.h5 Bxb5 44.axb5 Kf7 45.hxg6+ Rxg6 46.Rc1 Rg3+ 47.Kxb4

Note: although 100% of cases did not yield b3 it is already clear that white will win due to Bc8? or Rh8? also loses; hence, AlphaZero would have already won and there was no need for this alteration from Stockfish 8 moves

Supplementary material S10


Game 10: White: *AlphaZero*, Black: *Stockfish 8*, ECO-E17 Queen's Indian, 1-0

1. Nf3 Nf6 2. d4 e6 3. c4 b6 4. g3 Bb7 5. Bg2 Be7 6. 0-0 0-0 7. **d5** (last book move; 46%-35%-18%, N=512; Aronian Levon vs. Carlson Magnus, 2012, ½-½; Anand, Viswanathan vs. Carlsen, Magnus; 2012, ½-½) exd5 8. Nh4 c6 9. cxd5 Nxd5 10. Nf5 Nc7 11. e4 d5 12. exd5 Nxd5 13. Nc3 Nxc3 14. Qg4 g6 15. Nh6+ Kg7 16. bxc3 Bc8 17. Qf4 Qd6 18. Qa4 g5 19. Re1 Kxh6 20. h4 f6 21. Be3 Bf5 22. Rad1 Qa3 23. Qc4 **b5?** 24. hxg5+ fxg5 25. Qh4+ Kg6 26. Qh1 Kg7 27. Be4 Bg6 28. Bxg6 hxg6 29. Qh3 Bf6 30. Kg2 Qxa2 31. Rh1 Qg8 32. c4 **Re8?** 33. Bd4 Bxd4 34. Rxd4 Rd8 35. Rxd8 Qxd8 36. Qe6 Nd7 37. Rd1 Nc5 38. Rxd8 Nxe6 39. Rxa8 Kf6 40. cxb5 cxb5 41. Kf3 Nd4+ 42. Ke4 Nc6 43. Rc8 Ne7 44. Rb8 Nf5 45. g4 Nh6 46. f3 Nf7 47. Ra8 Nd6+ 48. Kd5 Nc4 49. Rxa7 Ne3+ 50. Ke4 Nc4 51. Ra6+ Kg7 52. Rc6 Kf7 53. Rc5 Ke6 54. Rxg5 Kf6 55. Rc5 g5 56. Kd4 **1-0**

32. ...**Re8?** can be the first choice of *Stockfish 8* (N=3), a5 is also sometimes suggested*

Stockfish 8 64	Stop	+	-	4 CPUs	
○	= (0.00)	Depth=22/41	32...Qh8 (3/26)	1889 kN/s	2.3%

1. = (0.00): 32...Re8 33. Qh6+ Kf7 34. Bxg5 Qg7 35. Qh4 Re5 36. Bxf6 Qxf6 37. Qh7+ Qg7 38. Qh4 Rh5 39. Qf4-
 2. = (0.14): 32...a5 33. Rd6 bxc4 34. Qg4 c5 35. Bxg5 Bxg5 36. Qxg5 Rxf2+ 37. Kxf2 Qf8+ 38. Qf4 Qxf4+ 39. g>
 3. ± (0.60): 32...Qh8 33. Qg4 Qg8 34. cxb5 Qf7 35. Qh3 Kg8 36. Rd6 Qg7 37. bxc6 Nxc6 38. Rxc6 Rae8 39. Rhc
 4. ± (1.06): 32...a6 33. Rd6 bxc4 34. Qg4 c5 35. Bxg5 Bxg5 36. Qxg5 Rxf2+ 37. Kxf2 Qf8+ 38. Qf4 Qxf4+ 39. g>
 5. ± (1.26): 32...b4 33. Rd6 Re8 34. Qg4 Rxe3 35. fxe3 Qf8 36. c5 Be5 37. Rf1 Bxd6 38. Rxf8 Bxf8 39. Qc8 b3 4!




Note: Re8 only temporarily seems secondary; at one minute it can reproducibly be the first choice of *Stockfish 8*

23. ...**b5?** can be the first choice of *Stockfish 8*, instead **a5!** is suggested (N=5; 100%)*

Stockfish 8 64	Stop	+	-	4 CPUs	
○	= (0.00)	Depth=23/53	23...Qxa2 (40/40)		25.3%

1. = (0.00): 23...Kg7 24. hxg5 fxg5 25. Bd4+ Bf6 26. Bxf6+ Rxf6 27. Rd8 Bg6 28. Rg8+ Kh6 29. Qd4 Qd6 30. Qg4
 2. = (0.00): 23...b5 24. hxg5+ fxg5 25. Qh4+ Kg6 26. Qh1 Kg7 27. Bc1 Qc5 28. Be3 Qa3
 3. = (0.08): 23...Nd7 24. Qxc6
 4. ± (0.28): 23...a5 24. hxg5+ fxg5 25. Bxc6 Nxc6 26. Qxc6+ Bf6 27. Rd6 Kg7 28. Rxf6 Rxf6 29. Qb7+ Kg6 30. Q>
 5. ± (0.28): 23...a6 24. hxg5+ fxg5 25. Bxc6 b5 26. Qd5 Nxc6 27. Qxc6+ Bf6 28. Rd6 Kg7 29. Rxf6 Rxf6 30. Qxa8



Note: Kg7 and b5 are evaluated as 0.00 but Kg7 receives the first choice (N=5); 1 min. calculation time, *Stockfish 8*

Supplementary material S11


Game 1-5 Repeat *Stockfish 8* calculation without any pre-calculation time; 1-minute calculation*:

Game 1: White: *Stockfish 8* - Black: *AlphaZero*: ECO-C65 Ruy Lopez, Berlin Defense; 0-1
Stockfish 8 move 35: **Nc4** seems not to be the choice, *Stockfish 8* suggests Rc1 (N=4)*

Stockfish 8 64 Stop 4 CPUs

⚪ = (0.00) Depth=26/48 35 Rb1 (13/20) 2175 kN/s 37.9%

1. = (0.00): 35.Rc1 g5 36.Kg1 Bg7 37.Kf2 Bxe5 38.fxe5 Kf7 39.Ke3 Ra2 40.d4 cxd4+ 41.Kxd4 Ke6 42.b4 Ra8 43.c4 Rd8+ 44.Kc5
 2. ♚ (-0.57): 35.Ng6 c4 36.Nxf8 cxd3 37.cxd3 Kxf8 38.g4 Rd7 39.Rg3 Bf1 40.e5 Bxd3 41.Kg2 Rd4 42.f5 Be4+ 43.Kf2 Bd5 44.e6 K
 3. ♜ (-0.79): 35.Nc4 g5 36.Nd2 Ra2 37.Rc1 Kf7 38.Nf3 c4 39.Ne5+ Ke8 40.Nxc4 gxf4 41.gxf4 Bc5 42.f5 Ke7 43.Ne5 Be3 44.Nc6+ l
 4. ♜ (-0.84): 35.Rd1 g5 36.Kg1 Ra2 37.Rd2 c4 38.Nxc4 Bb4 39.c3 Ra1+ 40.Kf2 Bxc3 41.Rc2 Bd4+ 42.Ne3 Bg4 43.fxg5 hxg5 44.h1



* *Stockfish 8* only found Nc4 in the first 10-20 seconds of the calculation time


Game 2: White: *Stockfish 8* - Black: *AlphaZero*: ECO-C65 Ruy Lopez, Berlin Defense; 0-1

Stockfish 8 move 34. **Qd3** seems not to be the choice, *Stockfish 8* suggests Qc2, Kg1, Nd2 (N=4)*

Stockfish 8 64 Stop 4 CPUs

⚪ ♚ (0.26) Depth=24/37 34 Rb1 (17/38) 1782 kN/s 39.1%

1. ♚ (0.26): 34.Nd2 h5 35.h4 Rd8 36.Qd3 Qh7 37.Nf3 Bg4 38.Rg1 Kh8 39.Rdf1 Bxf3 40.gxf3 c6 41.Rc1 Rff8 42.Rgd1
 2. = (0.21): 34.Qc2 Rd8 35.Qd3 c6 36.dxc6 Bxc6 37.Nd2 Qh7 38.f3 h5 39.Qc2 Be8 40.Nb1 Nc6 41.Nc3 Nd4 42.Qd3 B
 3. = (0.16): 34.Rb1 h5 35.h4 g4 36.Nd2 c6 37.b3 axb3 38.Rxb3 Bc7 39.Qd3 Nc8 40.Kg1 Rd8 41.Reb1 Qh7 42.R3b2 c
 4. = (0.12): 34.Kg1 h5 35.h4 g4 36.Nd2 c6 37.b3 Ra8 38.bxa4 Rxa4 39.Rb1 Bc7 40.Qd3 Nc8 41.Rb2 Nd6 42.dxc6 Bxc




Game 3: White: *AlphaZero* - Black: *Stockfish 8*: ECO-E15 Queen's Indian; 1-0

Stockfish 8 move 49. **Rf8** is a potential but less likely move, *Stockfish 8* suggests Kf8 (50%), **Rf8 (19%)***

Stockfish 8 64 Stop 4 CPUs

⚪ = (0.00) Depth=36/39 49...Re1 (19/20) 2168 kN/s 16.3%

1. = (0.00): 49...Kf8 50.Qf4 Qg8 51.Rxf7+ Rxf7 52.Qd6+ Ree7 53.Qb8+ Re8 54.Qd6+
 2. = (0.00): 49...Rf8 50.Qf4 a5 51.Bxf7+ Rexf7 52.Rxf7 Rxf7 53.Qb8+ Rf8 54.Qb3+ d5 55.Qxd5+ Rf7 5
 3. = (0.00): 49...d5 50.Bxd5
 4. = (0.00): 49...a5 50.Qf4 Rf8 51.Bxf7+ Rexf7 52.Rxf7 Rxf7 53.Qb8+ Rf8 54.Qb3+ d5 55.Qxd5+ Rf7 5



* Hashtable clearance and 1 minute calculation time; the results of this game move also shows that match parameters seem not to include a pre-calculation time – probably only a minute starting anew.


Game 4: White: *AlphaZero* Black: *Stockfish 8*: ECO-C11 Steinitz Variation, French Classical; 1-0

Stockfish 8 move 13. **a5?** seems not the first choice, *Stockfish 8* suggests Nb6! (100%, N=3)*

Stockfish 8 64 Stop 4 CPUs

⚪ ♚ (0.26) Depth=25/41 13...Rb7 (17/34) 1613 kN/s 42.8%

1. ♚ (0.26): 13...Nb6 14.f6 gxf6 15.Bh6 Kh8 16.Bxf8 Qxf8 17.Na2 a5 18.exf6 Bxf6 19.Nc3 Nd7 20.Nd1 B1
 2. ♚ (0.35): 13...exf6 14.Nxd5 Nb6 15.Nxb6 Qxb6 16.Kh1 Rd8 17.d5 Bc5 18.Bg5 Be6 19.d6 Rd7 20.Bf4 l
 3. ♚ (0.37): 13...Rb7 14.fxe6 fxe6 15.Na2 a5 16.Ng5 Nxd4 17.Bg4 Nxe5 18.Qxd4 Nxg4 19.Qxg4 Bf6 20.E
 4. ♚ (0.41): 13...a5 14.fxe6 fxe6 15.a4 bxa4 16.Nxa4 Nb6 17.Nc3 Nd7 18.Rab1 Rb4 19.Qe1 Nb6 20.Qg3



* 1 minute calculation time, no pre-calculation; Rb6 is also the first choice after hash table clearance (1 min., N=3)

Game 5: White: *AlphaZero* Black: *Stockfish 8*: ECO-E17 Queen's Indian; 1-0

Stockfish 8 move 22. ...**Nc5?** seems not to be the choice (0%), *Stockfish 8* suggests **hgx5!** (100%, N=3)*

Stockfish 8 64

Stop



4 CPUs



= (0.00)

Depth=26/45

22...d5 (5/25)

1833 kN/s

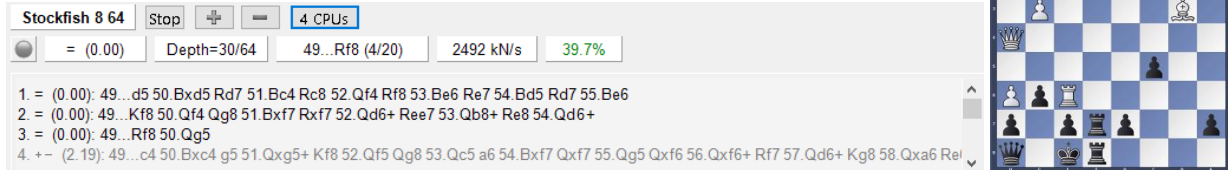
39.0%

- 1. = (0.00): 22...hgx5 23.Nxg5 Qxh5 24.Bf3 Qg6 25.Kg2 Kg8 26.Re7 Qd6 27.Qh4 Qh6 28.Qf4 Qd6 ^
- 2. ± (0.54): 22...Nc5 23.Be7 Nd3 24.Qf3 Nxe1 25.Rxe1 fxe4 26.Qxf8+ Qg8 27.Rxe4 d5 28.Re6 Nd7 29.Q
- 3. ± (0.58): 22...d5 23.Be7 dxe4 24.Bxf8 Nd7 25.Ba3 Ndc5 26.Red1 Be2 27.Rd2 Bg4 28.f3 Bxh5 29.fxe
- 4. +- (1.82): 22...Bd3 23.Be7 fxe4 24.Qxf8+ Qg8 25.Qxg8+ Kxg8 26.Bxe4 Bxe4 27.Rxe4 Na6 28.Rd1 d!



Supplementary material S12

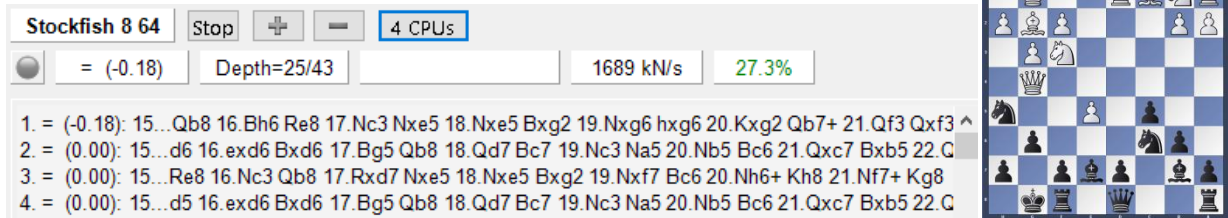
Game 3 Repeat *Stockfish 8* calculation without any pre-calculation time; 1-2 minute calculation:
Stockfish 8 move 49. **Rf8** (ca. 33%) is only a potential 1-minute choice, *Stockfish 8* also suggests Kf8*



Stockfish 8 64 Stop + - 4 CPUs
= (0.00) Depth=30/64 49...Rf8 (4/20) 2492 kN/s 39.7%
1. = (0.00): 49...d5 50.Bxd5 Rd7 51.Bc4 Rc8 52.Qf4 Rf8 53.Be6 Re7 54.Bd5 Rd7 55.Be6
2. = (0.00): 49...Kf8 50.Qf4 Qg8 51.Bxf7 Rxf7 52.Qd6+ Ree7 53.Qb8+ Re8 54.Qd6+
3. = (0.00): 49...Rf8 50.Qg5
4. +- (2.19): 49...c4 50.Bxc4 g5 51.Qxg5+ Kf8 52.Qf5 Qg8 53.Qc5 a6 54.Bxf7 Qxf7 55.Qg5 Qxf6 56.Qxf6+ Rf7 57.Qd6+ Kg8 58.Qxa6 Re1

Note: 1 minute (N=3) or 2 minutes (N=3) calculation time and HashTable Clearance; Game 3

Game 3 Repeat *Stockfish 8* calculation without any pre-calculation time; 1-minute calculation:
Stockfish 8 move 15. **Re8?** (0%) seems not to be the first choice, *Stockfish 8* suggests **Qb8!** (66%) (N=3)*



Stockfish 8 64 Stop + - 4 CPUs
= (-0.18) Depth=25/43 1689 kN/s 27.3%
1. = (-0.18): 15...Qb8 16.Bh6 Re8 17.Nc3 Nxe5 18.Nxe5 Bxg2 19.Nxg6 hxg6 20.Kxg2 Qb7+ 21.Qf3 Qxf3
2. = (0.00): 15...d6 16.exd6 Bxd6 17.Bg5 Qb8 18.Qd7 Bc7 19.Nc3 Na5 20.Nb5 Bc6 21.Qxc7 Bxb5 22.Q
3. = (0.00): 15...Re8 16.Nc3 Qb8 17.Rxd7 Nxe5 18.Nxe5 Bxg2 19.Nxf7 Bc6 20.Nh6+ Kh8 21.Nf7+ Kg8
4. = (0.00): 15...d5 16.exd6 Bxd6 17.Bg5 Qb8 18.Qd7 Bc7 19.Nc3 Na5 20.Nb5 Bc6 21.Qxc7 Bxb5 22.Q

Note: 1 minute (N=3), no pre-calculation; Game 3

* no liability assumed

** **General Note:** no liability assumed for— feel free to reproduce the identified moves yourself.